

AVIATION WEEK

MAY 21, 1951

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SUBMARINES BEWARE!

A fast lens catches a GRUMMAN GUARDIAN in mid-air close-up. Two versions of this carrier-based plane work together to protect ships of the U.S. Navy from submarine attack. Some GUARDIANS carry powerful detection devices. When these "hunters" locate an undersea enemy, more heavily armed, bomb-carrying GUARDIANS, like the one shown here, come in for.

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B.F. Goodrich



Weight taken from plane's brakes goes into its wallop

THEir heavy newtype built down assemblies with electric clutch equipment that these inherently independent sub-carriage units. And a packs a powerful wallop with 1200 lbs. of torque, 2000 ft. lbs. of torque and 2000 ft. lbs. of torque. But carrying all this equipment gives Lockheed designers a problem. Every possible pound had to be shaved off the airplane's empty weight. When a case to the wheel and brake assembly, they packed production-proven B.F. Goodrich's B.F. Goodrich brakes can be designed lighter for a given amount of kinetic energy than any other brake because of expedite tube design. The brake lining

is new design B.F. Goodrich Duprade Tube brake is mounted on expansion shoes—a construction that is lighter, yet gives longer wear. The brake has a new spider-type frame that's both light and strong. And the wheels themselves are light, strong expansion castings. As a tank B.F. Goodrich wheel and brake assemblies enabled designers of the Lockheed P-1V Vigilante to save a sizable amount of weight over other designs. The BEG brakes also provide smoother, safer landings. They respond smoothly and quickly to minimum pressure, take emergency overloads better,

cannot lock or grab. Brake resistance is increased because there's less to stop them. Leads are evenly distributed, reducing wear on brake parts. More, more is cut. The new B.F. Goodrich wheel and brake assembly is one of many effective solutions to conversion problems developed by B.F. Goodrich research and engineering. The B.F. Goodrich Company, Aircraft Division, Akron, Ohio.

B.F. Goodrich
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Aviation Week



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Robert F. Joyce

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NORTH AMERICAN AVIATION INC.

16 YEARS

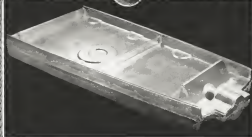
FAFNIR

Since World War II, North American Aviation, Inc. has resolutely concentrated on the development and building of better and better military planes like the Air Force F-86 Sabre Jet Fighter, B-45 Tornado Bomber, T-28 Trainer, and the Navy AJ-1 Attack Bomber. Such a policy puts an extra burden on their design staff. When it comes to ball bearings, North American has turned to Fafnir — an association of 16 years. This can be attributed to Fafnir's ability to offer more than just good bearings. It's an attitude and an attitude — a way of looking at ball bearings from the designer's side, an attitude gained from more than twenty years' specialization in aircraft ball bearings. The Fafnir Bearing Company, New Britain, Connecticut.

Fafnir Track Roller Bearings — one of the Fafnir Aircraft Type Ball Bearings specified by North America. Heavy stress on one wing with correct roller contact produces minimum track wear and compensates for errors in component parts. Strong inner



ring and full ball complement insure rigidity and high capacity. Efficient Fafnir Fly-Balls prevent loss of lubricant and entrance of contaminants.



Are you taking full advantage of the constantly growing range of forgings? Typical is this aluminum alloy forging with a projected area of more than 1,000 square inches used in the wing structure of a modern military bomber. Such forgings are today made possible by the use of the largest die forging press in America (18,000 tons). For hammer or press die forgings of aluminum, magnesium or steel, Wyman-Gordon engineers are ready to serve you—there is no substitute for Wyman-Gordon experience.

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 WORCESTER, MASSACHUSETTS
 HARVEY, ILLINOIS DETROIT, MICHIGAN

NEWS DIGEST

DOMESTIC

Willy-Oversland Motors, Inc. has entered a contract to tool for production of landing gear for the C-119. Contract exceeds \$5 million.

Cross has received orders for more than 1000 additional L-19 all-metal buses plans, bringing its Army contracts for this type up to more than 2000 planes. The firm has established a \$10 million line of credit as the basis of a Republic V-type credit agreement.

Paul U. S. acquired DMI Dove to be delivered from England to the country by air has flown for Atlanta in 23 hours being here against prevailing winds. Stop was made at Raykjavik, Blue West, Come Bay and Dorval. The Dove left transport a being delivered to a Hill of New Mexico.

Last of 22 B-55As have been converted to advanced RB 55E standards by Convair at Ft. Worth for delivery to the USAF. Modifications include installation of 3000 hp T56-W Wasp Major for more thrust, and installation of four GE J47 jets in pods beneath the wings.

Max Conrad set an unofficial cross-country record for lightplanes by flying a modified Piper Pacer non-stop approximately 2400 mi from Los Angeles to New York in 23 hr 4 min.

FINANCIAL

Nashua Aircraft Inc. has negotiated a \$9-million line of credit with a group of New York and California banks to strengthen its working capital. New arrangement was also concluded with the Reconstruction Finance Corp. Company reduced its RFC loan to \$3.5 million, and obtained an additional \$1.5-million credit.

Low, Inc. reports loss of \$12,131 for the year ending Dec. 31, 1958, on its revenue of \$7,511,337. Sales in 1949 of \$7,770,800 yielded a profit of \$750,000. Loss in 1958 credits were due to heavy pre-production costs. Mar. 31 backlog was \$30,033,800.

TWA World Airlines reports net increase after taxes of \$19,305 for the first quarter of 1959 on operating revenue of \$20,773,281. This is the first first-quarter profit since 1945. For the same period last year, TWA had operating revenues of \$21,295,162, and lost \$1,845,704.

Chicago & Southern Air Lines reports net income of \$274,327 for the first quarter of 1959 after boom and special adjustments on operating revenues of \$5,405,239. Before accrual for long-term operations and profit on sales of aircraft, net after taxes was \$74,309. In the period of 1946, operating revenues at \$2,804,180 brought loss of \$72,719.

Flying Tiger Line reports revenues of \$5,557,165 for the third quarter of its fiscal year, ending Mar. 31, and profit after taxes of \$96,005.

Capital Airlines reports net profit for 1958 of \$1,68,651 after taxes and special adjustments on operating revenues of \$28,098,916. Net income after taxes was increased by a \$93,500 profit on extension of debtors. For the preceding year, profit after taxes and adjustments was \$1,681,071, but \$847,493 of it was profit on debtors on 1/1/59.

INTERNATIONAL

Philippine Air Lines' dispute, which ended in resignation of President Andres Soriano and fire of his top executives, was expected to be finally settled last week, with Soriano winning the decision. President of the Philippine's Quirino and Co. Soriano publicly announced they had "agreed to agree" on a new contract which would sharply define the future roles to be played by the private enterprise management and government agencies on the carrier's board.

Royal Air Force has placed a production order for its first sweptback wing fighters, the Supermarine "Swift" based on the experimental Model 518. The Swift will be powered by a Rolls-Royce engine.

New women's speed record has been set by Jacqueline Aernol, daughter-in-law of the French president, piloting a French-built Vampart jet fighter at 389.245 mph. Previous record held by Jacqueline Cochran was 469.949 mph, set in a modified P-51 post-war engine fighter.

New order for two de Havilland Comet jet transports has been placed by the French Air Force, Clermont-Ferrand S. A. Delivery is scheduled for the end of 1959. Plans will be operated by a subsidiary, Union Aeronautique de Transport, which flies from Paris to Africa and Indo-China.

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VIBRATOR

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The Airborne Control Stick

Vibrator at a light, single reliable unit to advance to the pilot the approach of a model and may be used to indicate any vibration desired. When energized from a suitable pilot warning device, the vibrator sends a tone of approximately 7 periods at the pace of vibration and at a frequency of approximately 1500 cycles per minute.

The vibrator develops its force from the controlled force of an unbalanced rotor driven through gears from a shaft speed 20 to 30 rpm over motor. The motor meets all requirements of AN 34 G reserve value tests.

Currently, the Control Stick V. Series is being used on the McDonnell F4H Thunderbolt.



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SIDELIGHTS

Congress

Hearings will start soon by Senate Intelligence & Foreign Commerce Committee and legislation for \$6 million to develop a load device plan. ATA is behind the measure, claiming millions of dollars can be saved in most vehicles with its economical load-pool. House Appropriations Committee will examine Public Relations activities at the airport airport before it starts any hearings on fiscal 1952 military budget. A few weeks back the committee took Navy's chief, Adm. Stinson, to task as FR representative. Stinson was the Navy member of public relations activities on the Washington axis, and 516 elsewhere... Legislation appropriating \$171 million construction by NACA has been approved by House Armed Services Committee. The House Appropriations Committee recently turned down NACA's request for funds for the program, directing the agency to get authorization for NACA plans and the reauthorization of assets of Langley & Langley, a biological laboratory plant and high altitude field facilities at Lewis and Clark Air Force Base at Edwards Field. Early enactment of legislation for Commerce Dept. to allow war risk insurance to foreign and overseas assets is likely. The measure, approved by House Interstate, has already been passed by the Senate. Sen. Alexander Wiley told the Senate Commerce Committee he would like to see the fact that Mackay's was the vote "which was not against the Budget which contained Billy Mitchell." This confusion is rather amusing. Wiley refers to this effect, written by Katherine Johnson.

Transport

The report being done by East & East for the Senate Intelligence & Foreign Commerce Committee is pending. Some clue to the situation may come if a study completed it will beyond the question of negotiating commodity rates from military and air force airlines to the question of air cargo as a benefit to commercial through the airlines serving them. This study has not yet got to the DC-64 and might possibly be done already found it is possible to load 25,000 lb. aboard on less than 1000 lb. to load 13,000 lb. aboard a C-54. Larger loads, and the extra door forward of the wing makes why... The so-called Douglas Report, the transport mobilization survey which has been completed under auspices of NSRB, will start on the next day although its final outline has been published by Army Air Materiel Command. In general, the report suggests using an emergency air to help the commercial air line, mostly two-engine ships, as a transport base without possible military modification on various sizes, to be ready for military use, etc. Appointment of Malcolm Macdonald, New York, General, as executive vice president of North West Airlines latched a copy of power (Continued on page 50)



EGGS DUE TO DROP—Douglas AD Skyraider (Flight 50358), carrying three 2000-lb. bombs, takes off from the 27,000-ft. USS Valley Forge to strike enemy in Korea. Combat photo shows pilot a wing, considerable flap and slight roll-off on the tail.



QUAD-WINGEDED PACKET TESTED—Lockheed P-38 (below, left) has been fitted with new four-wheel log-type landing gear designed to improve plane's performance when operating on rough soil and infrastructure fields. The wheel track is proved mounted. Test equipment includes air-to-ground cone (right) to aid in measuring continuously the bank sustained during evolutions.



Military Planes In the News

KAMAN PERFORMANCE—Kaman Aircraft's prototype Navy HEK-1, which was seen publicly for the first time at recent Washington, D. C., Jetfighter Display (Aviation Week May 7), had only 1 hr. 40 min. flight time prior to show, was assembled from parts of three systems. The HEK-1 differs from the earlier K-21 in having longer, constant-speed rotors. It has a 250-hp. 6-415 Lycoming mounted behind the cabin. The "Rotax" had a converted to collective pitch to enhance light and maneuver characteristics.

TEMCO Well Into Second Phase of B-47 Program

Fuelage for the B-47, the World's Fastest Known Bomber, are rolling off the TEMCO assembly line with systematic regularity, due largely to the miraculous job done in the "take over" from the Boeing Plant.

The moving of machinery, duplication of tooling, the conversion of fixtures and the training of personnel was done expertly and efficiently without any delay in the delivery schedule. A record of which is to be proud but one that is becoming more and more common at TEMCO. Current operations are being streamlined for even better production in all phases of TEMCO's aircraft activity.

Stratojet World's Fastest Known Jet Bomber

The Boeing B-47 Stratojet Bomber is the fastest known bomber in the world with top speed in excess of 608 MPH. Capable of carrying more than 20,000 lbs. of bombs, its swept back wings measure 116 feet from tip to tip. The experimental model flew from Moses Lake, Washington, to Andrews Air Force Base, Maryland, in 3 hours 43 minutes, an average speed of 603 MPH.

QUALITY CONTROL STRESSED AT TEMCO

Precision manufacturing and quality control are two of the essentials in producing high speed military aircraft—such as the B-47—for tolerances must be measured in thousandths of an inch.

At TEMCO this rigid conformance to specifications is assured not only by a skilled and fully equipped inspecting staff, but more important by producing workers whose many years of aircraft experience have taught them that true quality is built in a product—not inspected in it.

TEMCO

ENGINEERS AND MANUFACTURERS FOR THE AIRCRAFT INDUSTRY



IS BUILDING THE REAR FUSELAGE SECTION OF THE B-47

STRATOJET BOMBER



The rear fuselage section of the world's fastest known jet bomber, the Boeing B-47 Stratojet, is being fabricated by Texas Engineering and Manufacturing Company. This swooping piece powered with six turbo-jet engines is the design that last year flew from the west to the east coast in 3 hours and 46 minutes, an average speed of over 600 miles per hour. TEMCO was selected for this demanding manufacturing job because of its proven aircraft experience and that invaluable asset—"productive know-how." The B-47 fuselage is just one of several major assemblies currently being manufactured by TEMCO.



Texas Engineering and Manufacturing Co., Inc.
DALLAS, TEXAS

WHO'S WHERE

In the Front Office

Paul Moore has been made executive vice president general manager of Luv, Inc. Moore was president of the Houston Mfg. Co. from 1945 to 1949. Previous to and since his Houston connection, he had been a business consultant.

Kendall Feltius has been promoted to vice president-engineering for McDonnell Aircraft Corp. In his new position Feltius will be responsible for all development of plans, designs, product control and process plants. He joined the company in 1941 as a project engineer and has been manager of development since 1949.

Manley S. Geller, vice president-secretary of the Garrett Corp., has been appointed vice president manager of Adaircraft Mfg. Co. of Los Angeles, a division of Garrett Corp., who joined the firm in 1949, has been in charge of production at Adaircraft, Los Angeles, since 1946.

Oliver M. Nelson, president of Transcon Air Lines, has been made president of Air and Engineering & Maintenance Co., Oakland Municipal Airport, military aviation service and maintenance, a subsidiary of TAL. Other new officers of AEMCO are Bernard A. Nichols, assistant vice president, Douglas F. Johnson, administration vice president, and E. R. Field, secretary. Former AEMCO president Ray W. Blanton, resigned to reorganize as Tulsa Airline of America.

Leo A. Carter and T. E. Spangus have been elevated to vice president at Douglas Aircraft Co. Carter had been general manager of the Santa Monica division and Spangus had held the same post at El Segundo.

Changes

Levin K. Mitchell has been appointed manager of the Lincoln-Belmont Division gas turbine plant which will soon be Westinghouse 146 for the Navy in a new facility, location not disclosed.

George A. Lovelock has been named general manager of Breda Aeronautica of the Curtiss Division. Previously, he was Charles A. Wolf serving him as Eugene Powers sales manager. Lovelock took over the agency created by the acquisition of the W. W. Pratt Co. and the Curtiss Division, Inc. (Emberly N. J.) as general manager of its instrument division.

George E. Zimmerman has been made manager of the aircraft division at General Electric Lockhead, Ohio, which is likely to obtain more of the business. Fred Nadeau was named manager of development new aircraft division. Mr. Nadeau was made manager of the prop. division, and Mike A. DeRosier has been named manager of layout.

Don Q. Beaman has been named vice president, aircraft and communications engineering for Northwest Airlines, incorporating Carl E. Swanson, who has resigned. George Martin is NWA's new assistant director of publicity.

INDUSTRY OBSERVER

► Douglas C-124A emergency parcel of over 70,000 lbs. attached at recent Edwards AFB, Mono, Calif. test flight, puts the big USAF cargo plane well ahead of any other production aircraft in this country, and probably in the world, at a load factor. While the new C-124A test is still short of the Cooney XC-99's record of lifting over 100,000 lbs. in payload, the Douglas test is none significant, lighter-in-weight. USAF is beginning to accumulate a sizable fleet of C-124As and has money over on orders, but there is still only one set of the Cooney XC-99s, and no firm plans for more.

► Pentagon sources report that the F-4E aircraft fire detector continues to advance test status but that it still has not been ordered for a production contract. The equipment produced by Photo Switch, Inc., Cambridge, Mass. is being flown at installations about the F-3A, T-33, B-45, and B-60D and the Cooney Turbofan. Air Force F-4E contract currently is for \$9,000.

► Production problems involved in getting the two versions of the Pratt & Whitney J-45 turboprop into sufficient production to meet demands at Navy and Air Force have brought about discussion of going back to the Allison J-35 engine for some of the Lockheed F-94s (the principal Air Force user of the J-45s). The F-94 versions will use an adapted Allison with the J-45, but the Grumman F9F-5s the Navy uses the J-45, does not use the Allison's, even in the turbo version originally planned for the Grumman plane. Chrysler was licensed by Pratt & Whitney to build the J-45, but approval provided for the Chrysler work to be done in a new plant, and there has been no public indication yet that the new plant is even started.

► Convair's 58-42 transportable dual wing XF-92A had work up set for additional test flights in the same range at Edwards AFB, Mono, Calif. Testing will be with a more powerful, new Allison J-35-A 29 engine fitted with afterburner, replacing the J-35-A 33 previously installed. The plane made more than 80 flights, many in the transonic range, with the former powerplant, and is expected to get substantially higher speeds with the additional boost from the new powerplant.

► U. S. technical representatives at the Alcockton division, International Civil Aviation Organization meeting, Montreal, opposed a definite decision to increase airplane seats in transport aircraft, or a safety measure. They were successful in blocking adoption of the plan, submitted especially by British representatives. U. S. spokesmen contended that further studies should be made on other means of increasing safety of passenger seating. A recommendation for a 50-percent increase in strength of seat attachments was vetoed (See p. 64).

► North American's T-28 tandem advanced trainer are coming out equipped with special auto-rotor and auto-rotor lighting on the instrument panel, so that the panel can be used by trainers with "view helmet" goggles in blind and night flying practice, without other extra equipment.

► Wide Chaco Aircraft, licensee of aircraft modification for installation of Allison T-40 turboprop installed on the recently XC-123A transport, it is understood that some phenomenal rate-of-climb figures for the proposed powerplant installation have been closely scrutinized by military authorities and, now in one sense in the popularity of the turboprop in the new 25,000-lb. payload competition.

► West Coast aviation observers are watching with interest the number of Cooney cargo planes which are becoming connected with Helmer Helicopters on one way and another as a possible key to the viability of some cargo talk which has been heard.

► Second order to be delivered Ltd., Canada, for Army Field Force Kansas River planes is reported to be on the order of 208 planes.

Washington Roundup

Holding Down Defense

The top military command is giving full support to the Administration's "to do" program for defense.

At opening sessions on the 1952 fiscal year military budget, (Undersecretary of Defense Robert Lovett, Joint Chiefs of Staff Chairman Gen. Omar Bradley, and Chief of Naval Operations Adm. Forrest Sherman have told congressmen that "the services are getting every penny they need or want." Gen. Hoyt Vandenberg of the Air Force has not yet been heard.

According to Rep. George Mahon, Chairman of the House Defense Appropriations subcommittee, "they are all going to get the same program for 1952 figures they thought. In January, would take \$104 billion."

It's the "new" program—but stretched out over several years, instead of being compressed into the time between now and the mid-1953 target date the JCS had set for all-out war readiness.

The U. S. is making itself for war, but not by aid "52. Actually the difference is more than \$40 billion because previous have shot up, \$104 billion will buy less now, and probably in the future, than it would have of January and 1952.

But, Mahon comments: "There isn't the slightest indication of dissatisfaction on the part of the military with the size and rate of the defense build-up."

Washington observers say that Gen. Bradley, who now tells congressmen they are getting the "best" defense program for \$66 billion that they would get \$114 billion, told the same congressmen over the quarter preceding the June 16 Korean outbreak that the U. S. was getting more defense than former Defense Secretary Louis Howe said his economy program.

More Money—In January

The three services will shortly ask for more money than the \$63 billion appropriated for the '52 fiscal year by the President in last year's defense program.

But they won't get it for a while. The President's military budget for the '52 fiscal year, which starts July 1, is based on the premise that the fighting in the Far East will all be over by then, despite the prospect for an all-out Chinese Communist spring offensive.

Undersecretary Lovett and JCS Chairman Bradley have asked House Appropriations Committee members they will block the services' requests for seven or eight months. Defense Department won't be back asking Congress for more money until next January, they say.

Rep. George Mahon explained: "They say money won't be needed to take care of Korean losses for a good many months—but we're not losing enough planes to replace and that we've still stocked an ammunition."

No More Contracts

There won't be any more phase or option contracts for at least another month. Air Force and Navy have already obligated all the money they have available. The purchase of \$44 billion, the \$750 million for procurement now pending in Congress, is to make down payments—between the time it is awarded and July 1—on contracts already let.

USAF won't have any more procurement money to allocate until the '51 fiscal budget, with \$100 billion for planes and parts, is approved.

But generally, USAF and Navy won't have money to let new contracts until the new budget comes through.

The next flow of contracts to phase and option contracts probably won't come before July.

Guided Missile Supply

Defense Department's drastic outlook will slow Navy's and Air Force's guided missile programs—apparently so prominently pegged on the defense build-up.

This year, USAF had \$150 million for cruise projectiles, the proposed budget allows only \$130 million for next year. Navy has \$160 million this year; the new budget gives it only \$75 million.

Undersecretary Robert Lovett and Defense Department Comptroller W. J. McNeil did not give any explanation for the startling action.

Here and There

• U. S. Chamber of Commerce adopted a plank for a single regulatory agency for all types of transportation at its annual meeting.

• Annual Separation, Congress will probably have down C-47s program for funds to make studies leading to the elimination of unnecessary rates for all domestic routes by the end of the year. CAB asked for \$25,800 as a study. Senate Interstate and Foreign Commerce Committee's chairman, Sen. Edwin Johnson, opposes the grant. "It will only delay legislation, causing repetition of similar pay-back subdivisions. What CAB has studied on, they will keep asking Congress to postpone and postpone—until they have finished their studies."

• Small Business, The abundant fact about going small is a bigger slice of the defense business will increase. But little will actually be done about it. The basic fact is that present production of planes and other major procurement items, as allocated by small business' friend, Rep. Wright Patman, would end the cost of the defense program skyrocketing. If it is one of insoluble theory not fitting the practical situation, observers say.

• Pilot Training, Congress won't take up legislation setting up a reserve officers training program—and advancing the 187 colleges with USAF ROTC program and the 251 colleges with Army ROTC programs to contract with private schools for flight training—until the draft bill has been drafted. This is on the draft for the duration of the MacArthur investigation. At best, it will be another month before House and Senate Armed Services Committee get around to focusing on the ROTC program.

• Investigations, Claimed by the House Armed Services Investigating Committee, headed by Rep. Edward Hebert, to make observations, interviews and case and plant inspections at its first order of business.

—Katherine Johnson



THE PLANE that is the star of Chase Aircraft's C-121, jet version of which is shown. Its sale depends on the Air Force and Army, but growing it is...



THE MEN who have joined forces, Chief Engineer Struss, left, and President Knorr, Washington Air Force Undersecretary W. A. McCone, and Public Relations Director Neil Morley.

Kaiser Deal Spurs New Drive on C-123

Stock sale to auto firm gives Chase long sought cash and production resources.

By Ben S. Lee

Toronto, N. Y.—A \$2.5 million purchase of 49 percent of the Chase Aircraft Co.'s stock last week, moved Edgar Kaiser, president of Kaiser-Frazer Corp., more squarely into the middle of the aircraft manufacturing business.

The new combination of Kaiser and Chase had the aircraft industry spotlighting last week as to its effect on the Kaiser-Frazer program for production of Fairchild C-119 P-27 turboprop transport at the K-F plant at Willow Run, Mich.

Spurring industry competitors was the background knowledge that Fairchild Figure 8 Turbine Propellers had at first reportedly opposed the Air Force-sponsored "foreign building," which made Kaiser-Frazer a Fairchild licensee to build the P-27s. And further back, ground was the fact that Fairchild and Chase had been strong competitors for the small transport competition won by the Chase C-121.

Plans—according to Edgar Kaiser, while immediate plans are to stop out complete engineering plans for military production of the Chase C-123, the company will also begin exploration of commercial applications of various Chase designs.

Struss had already completed

development of approximately 400 of the transports for Army Field Force, but has been building up the fuel gauges on an order in Chase. Under the new agreement Kaiser Industries, Chase is expected to make a strong bid to clear away obstacles remaining and get production going.

The Kaiser-Chase transaction, also had the aircraft industry spotlighting last week as to its effect on the Kaiser-Frazer program for production of Fairchild C-119 P-27 turboprop transport at the K-F plant at Willow Run, Mich.

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Struss had already completed development of a new twin-engine jet

service transport which Kaiser and Struss both believe to be substantially less costly of economy and versatility. In its present configuration, the new transport would be powered by two Pratt & Whitney R-1300 engines, set 16 propellers plus cowling, cruise at 170 mph., and land at 60 mph.

The concept, according to Struss, also has several other design features, many powerful, low-weight transports-in-turboprop and turboprop versions—which are scheduled for complete analysis with a view to manufacturing under the new agreement.

• Two Securities-by-Fairly has already indicated that it desires two sources of supply for military production of the Chase C-123 because of military requirements. A money loan, sent by Lt. Gen. Kenneth Wolfe, Deputy Chief of Staff for Materiel, has just completed an inspection of the Chase Toronto facility to determine its capability for production of the C-123. Its findings have not yet been disclosed.

Second source supply for the C-123 is now under consideration by the Air Force and that manufacturer is to be named within the next two months. Air Force Undersecretary W. A. McCone has indicated that the second source supplier will probably be an aircraft company which has not, until now, expanded production in defense production. There are several companies he said, which have had considerable aircraft production experience.

Kaiser-Chase, meanwhile, is hard at

work completing proposals to place the YC-125 in initial production at the Chase Trenton facility and later to begin production at the former Boeing/McCaw-Patterson plant in Bechtelham, one of the former Douglas-Chase plants which is still held in steady-state by USAF.

Chase now faces six bids of the Boeing/Chase facility and is pending USAF authorization of major production there. But Air Force has previously indicated that it holds acquisition rights to that facility, and some Pentagon acquisition experts do not consider it entirely probable as a production site for a major aircraft. There is some USAF consideration, carrying considerable weight at present, to converting the Trenton facility to being the use as a modification center for a current production aircraft. For this reason, it is reported, Chase is also submitting alternate proposals for the use of the Douglas-Chase facility as well as the Trenton facility.

The Douglas-Chase facility is now being used as a temporary storage depot for the National Air Museum and a considerable number of helicopters to meet aircraft on new inventory. In addition, according to USAF, several other major activities are now being conducted there but the facility is available for aircraft manufacture if needed at the manufacturing program.

► **Kaiser-Fordchild Production**—Acquisition of the contract in the Chase Aircraft Co., Kaiser retained, will be on an effect C-119 production.

Tooling engineering for Kaiser production of the C-119 at Westcott is now virtually complete, he said, and the first production model should be flying by the end of the year. First production rate called for by USAF should be made in an approximately half-hour time between the two plants.

"As a matter of fact," Kaiser continued, "we intend to transfer approximately 200 of our top engineering tooling personnel from Willow Plain to Trenton as their activities with the Fordchild project are completed." The transfer is expected in the next 30 days. The Chase Trenton facility now employs approximately 800.

Steadfast declines that both Chase and Kaiser-Fordchild will begin in some date retooling program to gain another 500 employees within the next 90 days. There will come primarily from two sources—Kaiser West Coast operations and its plants in the Chase Trenton area—he said.

Purpose of the immediate expansion of Trenton personnel, Kaiser explained, is to expedite Chase Aircraft's existing production engineering contract with

the Air Force. A committee has already been appointed to review Chase's production engineering organization, he said.

Chase already has had enough material to build 27 more C-123 planes at Trenton, together with permanent jigs and millwright tooling to begin first production, according to company report of contract, Steadfast said.

Current company thinking is that initial production will be performed at Trenton with a request for major production at a larger facility elsewhere. If this is authorized by Air Force, the Trenton facility will be required for components manufacture of the military production (C-123). The company will build its Trenton facility with a 100,000 sq ft building, he said.

► **Chase Background**—Steadfast increased the Chase Aircraft Co. in New York in February, 1941. During succeeding years Chase designed, built, and flew its own military and cargo-carrying gliders and transports. This was done last month when the company flew the first American-developed jet transport, a jet-powered version of the YC-113 jet, the first time that one aircraft had flown as a glider, with conventional engines and with jet power.

The jet version, powered by four GE J-47 jet engines, is still at its development stage. The J-47 develops 5383 lb. thrust each.

The first craft built by Chase was the CG-14, all-wood troop-carrying glider, capable of carrying 34 passengers. It was the first jet to fly in January, 1945. The second craft produced by Chase, the CG-14A, was a 23 place glider. It was of similar design to the CG-14, but with tubular metal fuselage and metal wing.

The company moved to Trenton in December, 1946, and undertook construction of the CG-15, an all-metal, 30 place glider, and flew it 12 months later. In November, 1948, Chase flew the YC-122 two-engine troop and cargo-carrying transport, marking the company's entry into the powered aircraft field.

The YC-123, latest of Steadfast's design, is capable of carrying 60 passengers and was first test flown in October 1949. Shortly thereafter, the aircraft design was flown as a glider and designated CG-35.

Both the first jet wing with the YC-122 and the CG-15, was evaluated by the USAF and Army at Elgin AFB, Fla., but failed, together with several transport-type engines of two other major manufacturers. The YC-123 was (Aircraft Week Oct. 21).

How Rentzel Sees

Transport Future

Within three years, helicopters will be getting shortline passenger service and perhaps long-haul service, too, says Rentzel. Jet and turboprop transport will be introduced on first production, according to company report of contract, Steadfast said.

These are statements by Commerce Undersecretary Delta Rentzel to the Senate. Witnesses, Assistant Commerce Commissioner. He says these are not predictions, "they are based on the economic and technical facts."

The remarks, Rentzel did not refer to production, but rather to the fact and admission that the nation's industrial goods does not have to be transported completely over to a sea crossing mode necessary by an attack on the U S over the sea.

In addition, an earlier segment of local color operations may soon begin experimenting on the use of passenger helicopters. We already have plans for helicopters to carry passengers from downtown areas out to principal air terminals. But we also have more expectations that in the longer development it will be used on longer routes, and then develop into a local sea transport.

As to what's ahead, he says "Of course, we could start say on all of these developments, but I believe possibly that it would only make sense the time of new aircraft. The military knows now the value of a multi-engine transport, and powerful civil transportation system, and for that reason it is confident that air transportation would continue development under our conditions."

When the next year, Rentzel says, "We will see an special small modern transport type introduced in our local airports that will improve their service and be an economic advantage. It is expected that the present one seater C-47's." (See story on p. 8).

Korea Air Losses

UN plane losses in Korea due to enemy action have been 21 through May 5, Lt. Gen. G. F. Weyland, chief deputy commander of the United Air Command in Korea, said. At that date, enemy plane losses are estimated at 149 destroyed, 27 probable, 107 damaged. Of these, 139 were hit on the ground. MG-15 fighters were given by the general as 51 destroyed, 17 probable and 103 damaged.



XF91A DELTA WING. Inspiration for Convair's Navy shipboard fighter design?

Navy Studies Radical New Fighter

Convair and Lockheed are building convertiplane-like prototypes around Allison T-40 turboprop engine.

The Navy's answer to the recent Air Force and Army convertiplane concept time is a two-engine craft.

It will be a fast turboprop aircraft with a rate of climb expected to be only that of piston fighters, jet or propeller. But even more significant will be its takeoff and landing characteristics. Specifications call for it to make vertical takeoff, takeoff and landing using its propeller as a rotor. Presumably it will also be able to hover like a copter, or land on a runway.

► **Two Companies**—Two West Coast companies, Convair and Lockheed, are developing prototypes, both using the Allison T-40 dual-section turboprop engine as powerplant. While the original Allison T-40 engine was credited with 3700 horsepower, that figure, a manufacturing revision of the T-40 is understood to step up the power to the vicinity of 4000 hp.

All three major propeller manufacturers, Curtiss-Wright, Aeroquip and Hamilton Standard, are reported to be preparing an blade dual-section propeller for both engines in the cooperation.

West Coast sources see a close similarity between the new Convair craft and the Convair XF91A, a delivery jet experimental Air Force plane in test flight and wing configuration is considered.

However, both new planes will have their wings pivoted at a much greater angle than is customary for today's aircraft, and will have landing gear near the forward fuselage like conventional aircraft, it is understood.

Planes will be designed for shipboard operations, and presumably will be capable of operating from virtually any size carrier, if they attain the stated takeoff and landing characteristics.

The new designs will represent a new concept—combining the advantages of turboprop engine power with the special features of helicopter plants. The question for a plane made in theory indicate what may be expected.

► **Flying Prototype**—A forerunner of the plane now being developed was the World War II Chance Vought "Flying Panicle" XF91A. Although completed at war's end, it never flew as its full power, full rotor system and was shelved and finally acquired. The ducted cut-back which led to the new version in the early postwar years was in answer that Navy could not do full test even the small amount of funds necessary to carry out the plane's flight test program.

In the light of the present new program, the XF91A's design specifications are being reviewed. The plane was powered by two Pratt & Whitney R-2000 Twin Wasp engines based in

the large oval nacelles mounted on either side of the nacelle. These were by means of right-angle transmission shafts, four-blade Hamilton Standard propellers mounted at the nacelle, using a fixed relative gear ratio. Special clutches prevented these engines to drive both propellers in emergency one-engine-out condition.

Prototype was specially developed for the XF91A, with structural blades number in those cases on helicopter rotors. This means that at high angle of attack the blades would move forward at constant pitch and then flatten out, if they moved all, in that plane was to be capable of hovering in low air speed.

Plane was designed for a speed range of from 40 mph to 425 mph, with expectations that a later model with turboprop power could attain an even wider range of speed to 510 mph.

► **Low Hovering Speed**—Low or low hovering speeds were to be attained by moving the plane up into vertical climb position and hovering on its propeller. The lowest the forward fuselage, the more power would be required for hovering.

Since the Chance Vought plane, which was designed by Glenn Zimmerman, well known NACA engineer, there have been marked advances in power plants and in propeller which might give the new aircraft even more phenomenal performance than that which was projected for the Flying Panicle.

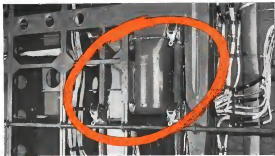
Study Civil Air Role In A-Bomb Defenses

Civil aviation's role in the emergency transportation pattern in the event of an atomic attack will be studied in Washington next week. The committee will take place before Federal, civil and military officials and will be a forum of leading civil aviation organizations May 28 at the McGuffey Hotel.

Under sponsorship of the American Training Society, an organization of large aviation schools and flight schools, the two-day forum panel will discuss "Civil Aviation's Role."

There are the participants and their organizations: Milton Arnold, Air Transport Association; Joseph T. Gutzberg, Jr., Aircraft Industries Assn.; J. S. Hammett, Aircraft Owners and Pilots Assn.; Crocker Shoup, National Assn. of State Aeronautics Officials; Wayne S. Hinkle, National Aeronautics Society; N. F. Sibley, Commercial Aircraft Owners Assn.; A. E. Cary, Airport Operators Assn.

The focus will be a feature of the annual ATIS seminar and dinner at the Sheraton Hotel. The CAA legislative initiative committee will address the gathering.



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AERONAUTICAL ENGINEERING

The Atom: Power for Flight

ALMOST SIX YEARS AGO, the first atomic explosion shattered the quiet of dawn over the New Mexico desert. Less than one month later, two million miles were devastated by the energy stored in chunks of material the size of your fist.

THE NEXT YEAR YAPPOHEI Hiroshima and Nagasaki was reduced in one outbreak of a second. It was unbelieved, uncontrolled power production. But there were thoughts of controlling it, of ways to slow down the process and to make the enormous power source in the atom available to drive turbines, wheels, propellers.

IN FEBRUARY of THIS YEAR came the announcement that the feasibility of actually producing by nuclear energy had been demonstrated in theory. With that simple statement of fact, the aircraft industry was presented with a new world full of possibilities—and associated problems. Since February, AVIATION WEEK has been gathering the material necessary to separate you with the new source of power. The result is a series of four articles, of which this is the first, intended as a background necessary to the understanding of nuclear energy and its application to the propulsion of aircraft.

By David A. Anderson

Present ideas on atomic structure visualize it as subgroups to our solar system—a central nucleus (sun) surrounded by orbital electrons (planets).

There are three structural building blocks from which all atoms are made:

- The electron, a lightest particle capable of separate existence, carrying a negative charge of electricity.
- The proton, a particle 1837 times the mass of the electron, carrying a positive charge of electricity of equal magnitude to the negative charge of the electron.
- The neutron, a particle of mass about equal to the proton, but carrying no electrical charge.

Any atomic nucleus—23 billion of them in a line would span one inch—is built of an integral number of protons. Hydrogen—the simplest atom—contains one proton. Uranium has 92.

The number of orbital electrons exactly equals the number of protons in the nucleus; thus, the resultant charge on the atom is zero.

► **Structural Number**—The number of protons in any atomic nucleus is called the atomic number of the substance. (Therefore, for uranium, the atomic number is 92.)

The mass number is a whole number which represents the approximate ratio of the mass of any atomic nucleus to the mass of one proton. The word "approximate" is used as the definition in adapting the awkward use of fractional numbers.

Uranium in nature occurs in three varieties, of mass numbers 234, 235 and 238.

These are chemically identical species of atoms which have the same atomic number (and therefore the same

atomic structure) but different mass numbers (which means that their nuclear structure differs). Both occasional types are called isotopes. U234, U235 and U238 are all isotopes of uranium.

There has to be some way to explain the existence of isotopes and the difference in mass numbers. And here is where the neutron comes in.

► **New Particle**—The neutron, the star performer in the atomic theater, is a recent (1932) addition to the cast. It is a component of atomic nuclei. The fact that the particle is unchanged allowed its discovery—and also makes the free neutron a high-speed atomic projectile impossible of direct detection.

The number of neutrons in an atom is defined by the difference between the mass number and the atomic number. For Uranium 235, the mass number is 235, subtracting the atomic number, 92, leaves 143 neutrons.

The present view of nuclear structure assumes binding forces between protons and neutrons in the same nucleus, coupled with repulsion between positively charged protons. Apparently there have been attempts to list only some combinations of protons and neutrons as stable. For a simple analysis of low neutron and proton, stability exists when their numbers are about equal. For some complex structures, the analysis of neutrons seemed a useless disorganizationally until, at somewhere around 170 neutrons, stable nuclei cease to exist.

► **Walk to Do**—In order to develop a stable nucleus, work must be done. Einstein's famous equation relating mass and energy indicates that the total mass of a stable nucleus should be actually less than the sum of the separate protons and neutrons that comprise the nucleus. The difference in mass should be the equivalent of the energy needed to form—or break up—the nucleus. And

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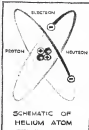
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this energy is called the binding energy. Taking lithium as an example, only 112,000 by-lb would be needed to disintegrate all the nuclei of all the atoms in one gram (1/70 ounce) of lithium.

Conversely, the same energy would be released in forming a billion atoms from neutrons and protons.

Atomic binding energy figures are available for many different atoms. And the general trend of these figures shows that binding energy increases to a maximum value for atoms around the middle of the periodic table and then decreases again. So, nuclei of mass numbers from 40 to 108 are most strongly bound.

And any reaction which results in forming lighter atoms releases energy. Getting Energy—The conservation of momentum as binding energies leads to the supposition (proved at Alamos) that the energy can be released by breaking heavy nuclei into several small fragments, or by combining light nuclei to produce heavier ones.

To produce this energy—to initiate a nuclear reaction—neutrons must be produced.

But merely having neutrons is not enough. There is no guarantee of collision between a free neutron, striking along through space, and a nucleus waiting. To be certain, for instance, if you built a greatly enlarged model of the atomic structure, and represented the nuclei by ping-pong balls, you would have to space them at 250-ft intervals to maintain the correct proportions.

So the probability of nuclear reaction varies, depending on the particular atoms, and on the bullet which hits it.

The particular nuclear reaction that led first to the atomic bomb and later



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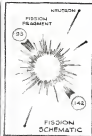
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to considerations of power generation at lower to lower. And we are particularly concerned with the fusion of atoms, although some other fissionable materials may come into discussion from time to time.

► **Rocket Addition**—Discovery of systems fusion occurred only a little over twelve years ago. There are two ways to look at the process, direct description is one, but a simple analogy is perhaps a better introduction.

Atomic nuclei have been compared to drops of water held together by the binding force of nuclear forces. Any disturbance of the water drop from its spherical shape can only be accomplished by the addition of energy.

Suppose some energy is added to the water drop—it could be the impact of a speck of dust blown through it by the wind—and the drop is broken up into smaller droplets. If these were high speed photographs of the process, you could see that the drop, as it moved, begins to take the shape of a dumbbell and you could then see the two balls of the dumbbell become more spherical and finally, the thin thread of fluid between them would break. The two droplets would at first be compressed where the fluid's thread had been at tacked, but surface tension would soon form each into a sphere.

Exactly, this is what happens in nuclear fission. More sophisticated, this is what occurs.

► **Nuclear Fission**—A free neutron, carrying through the nucleus structure of the outer electron shell of an atom, slams into the nucleus. The addition of the neutron creates a compound nucleus, and the nucleus gives an energy run. If there is enough energy to do this the atomic structure (in something analogous to the dumbbell) is the

water drop process) the nucleus breaks into two separate fragments propelled in opposite directions. There is a net decrease of the mass of the system (much like what happens in fragmentation of the waterdrop), the mass difference appears in the form of energy.

The two fragments which were formed by fission have atomic numbers and mass numbers which when totaled give the mass number and atomic number of the original single nucleus. But the two fragments' nuclei are actually smaller, they have a combination of neutrons and protons which cannot stay in equilibrium.

So in order to maintain equilibrium, the atomic structure must rearrange itself. It can do this by emitting all the surplus neutrons by converting the electrons into protons by giving off electrons or by some combination of these two possibilities.

► **Elemental Products**—With uranium, the fission products are not of equal mass, instead, they are of mass numbers about 140 and 90. Only a few neutrons are emitted, the remainder of the mass is the substance of electrons (radioactive decay) and stable nuclei are formed.

Using current data for bombing target, calculations show that the pattern for arrangement gives a fuel total even considerable less than the original mass of uranium, and that tremendous amounts of energy are released.

More of the fission energy appears in the kinetic energy of the fission fragments—the two unstable nuclei mentioned below. These particles, moving their kinetic energy, have speed around 22 million mph. The kinetic energy due to the high speed protons, by collisions a temperature rise in the reactor.

In the meantime, the neutrons which were liberated have been tearing into other nuclei, destroying and leaving structural changes, with the further release of fission particles and neutrons. And this brings us to the concept of the chain reaction.

► **Definition**—Chain reaction is a degenerative mass which partly sustains the process. It means simply that one fission process releases more free neutrons which initiate other fission processes. And these in turn trigger more fission processes. The whole chain reaction takes only a short time, it allowed to proceed uncontrolled.

An one example of the speed of reaction and the amount of energy liberated, consider doubling the weight which undergoes fission in each step of generation. In eight generations, there would be 16 in the 24th generation in the system, which is enough to cause the fission at every nucleus nucleus in a little over half a second. At maximum the energy released would be 6.7 mil-

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FRISON of one expansion atom (top) has released four neutrons, causing fission in two more atoms (middle). Four neutrons are used to initiate with nuclei of four U235 atoms, containing three.

low up to. And the time for completion of the process would be less than 1 millionth of a second.

The uncontrolled release of such enormous amounts of energy in such short time results in a fission explosion. And it is triggered by one extra neutron neutron.

Reaction Control—To maintain maximum fission power, there must be two neutrons available. The number depends on what happens to each one, then set these possibilities:

- Neutrons can escape from the system, which means a complete loss of those neutrons.
- Neutrons can be captured without fission by impurities either in the system or in the fission products.
- Neutrons can cause fission, and in so doing, liberate more neutrons.

Which of these three occurs depends on the physical structure of the system, and on the critical size.

By definition, the critical size of a fission system is the size that produces no change in the total number of neutrons in the system. Reorganizing that a bit, when a fission system is at critical size, the number of neutrons produced by fission exactly balances the number lost by escape or absorption.

A system of smaller than critical size can not sustain a chain reaction.

Reaction Maintenance—Tied in with the concept of critical size is the use of a fission "kick" device: the system's ability to sustain a chain reaction. The

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EXHAUST MANIFOLD SYSTEM life span is extended by use of thin ceramic coating.

Ceramics: Exhaust Protection

Research pushed on thin coatings to help improve heat and corrosion resistance in new higher-power engines.

The potential of ceramics is being exploited to lock exhaust system problems in high-power piston engines.

Chemists for this application is not entirely new. In World War II, Ryan Aeronautical Co. turned out more than 500 exhaust systems with thick enamel coatings for the Douglas A-20 attack bomber, when the low-carbon SAE 1020 steel was used instead of the ordinary steel steels.

But Ryan is still pushing its development studies because the necessity for improved heat resistance and for checking corrosion in exhaust systems has greatly increased. Today's piston plants, with their boosted power and higher exhaust temperatures, have created more severe operating conditions for exhaust system components.

► In Stratoliner—New Ryan, Boeing and Pan American Airways engines are tested in tests on thin coatings of 501-3014-015 coatings or Ryan-built exhaust parts at a PAA Stratoliner operating under regular severe conditions on Trans-Pacific route.

First check in Ryan's engineering lab was on exhaust heads having 650 hr. of service. These components built directly to the engine cylinder heads. Some were ceramic-coated inside and outside, some inside only, others had no coating. Alka checked van heads fabricated of heat- and corrosion-resistant steels.

The 600-hr. proving period already has established sufficient data to warrant production of B and C row cylinder head assemblies with ceramic

coatings for the Boeing Stratoliner.

One example of the protection offered by the coating is seen in the application where only the inside of the head is covered. There was but a slight reduction (.085 in.) in gage thickness, resulting from sooting on the outside surface.

► Protection Efficiency—The tests have been extended to cover a longer operating period. After 1234 hr. of service, there was no reduction in gage thickness (.985 in.) on the head's crown on both sides, indicating that the ceramic was completely effective in retarding corrosion over this extended period.

Heads used in the Stratoliner are built by Ryan of 37-9DL steel. The ceramic coating is National Research Standards' type AW17, designed for jet engine and other high temperature applications, to prevent oxidation, carbon deposition and corrosion effects. Ryan heads that head, then ship it to California Metal Finishing Co., Los Angeles, for the coating process.

► Other Applications—Other tests are being conducted on an Ansonian Avenger 240 which has the same exhaust system of both engine main-cool, and an auxiliary PAA Stratoliner which has one power-plant's collector ring as well as the head assemblies covered with the enamel.

Report is that future exhaust systems for Boeing B-50s and C-97 Stratofreighters will incorporate ceramic fire protection.



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and Air Force Engineers throughout the country credit with FAC engineers and craftsmen to study these methods. Inadequately, Pacific Airframe is the only privately owned concern in the country authorized to overhaul these 4300 engines. The CAA has also approved the 200 saving of 100-cu-in. time, as performed by FAC engineers.

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Ozone Handling Technique Studied

Improvements in the technology of ozone manufacturing means successful recovery by Clark B. Thorpe of Illinois Institute of Technology. Scientists working at IIT's Ames Research Foundation have demonstrated that ozone can be handled more efficiently, and thus have opened the door to possible economy production of the substance.

Ozone, dark blue in its liquid state, can be condensed at concentrated air pressures by three oxygen atoms per

molecule instead of two). And it has two major causes when it is formed: It can be decomposed directly (and almost too easily) to oxygen for nitrate firing, and it can be a more powerful oxidizer for rocket fuels. In the latter application, liquid ozone has a higher density than liquid oxygen, which means that more weight of oxidizer can be stored in a given volume of nitrate tankage. With respect to hot-oxid losses during steady-by flow, low tank maintainance and less tank weighing would be necessary. This is because liquid ozone boils at a higher temperature than liquid oxygen does.

of the order of 1900 lbs. In the V-2 rocket engine, for example, the mixture of oxygen and alcohol allows a jet velocity of about 5500 fps. Using liquid ozone instead of liquid oxygen would step this up to about 5000 fps, and a more modest speed and range about proportionately.

Ozone research at Ames Research Foundation has been under the auspices of the Air Research Co., Inc.

Jet Turbine Blades Tested in Flight

(McGraw-Hill World News)

London—What is believed to have been the first strain testing of jet turbine blades in flight took place recently at the development airport of Rolls Royce Ltd., at Hucknall, Nottinghamshire.

According to RMI Patents Limited (which supplied part of the equipment) the testing is carried out as follows:

Electrical measuring equipment are built into the turbine blades and electrical connections made to a radio transmitter in the aircraft by means of special necessary slipring contacts. When the jet engine is running, test stress which are set up will appear as an electric signal which is transmitted to the ground, where it is recorded on magnetic tape so that it may be examined under laboratory conditions.

It was found impossible to set a high-speed camera for a flight period of about 1 of an hour. Magnetic tape recording proved to be the only suitable method for obtaining an accurate record of these signals, which may include frequencies up to 30 kc./sec. A standard EMI studio type tape recorder has been used by R/R for the purpose.

New Tunnel-Drives

The expanding scope of high-speed wind-tunnel research is pointed up by a new design of a 100,000-hp drive.

This large electric motor unit and a compressor, 110,000-hp drive will be built by General Electric Co. for installation in two supersonic tunnels at the National Advisory Committee for Aeronautics' Ames Lab at Moffett Field, Calif.

The 100,000-hp installation will power a new 5-ft supersonic tunnel, will be capable of a peak one-hour output of 216,000 hp., and comprises four 45,000-hp variable-speed induction motors mounted in tandem on a single shaft by driving either of two compressors.

The 100,000-hp drive comprising two 45,000 units and one 27,000 hp unit will replace the 27,000-hp unit in the present 16-ft tunnel. These steps on a single shaft will create the wind for 510 to 920-cps speeds.



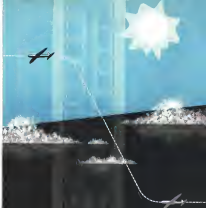
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AVIATION WEEK, May 21, 1971



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NACA Reports

► An Analytical and Experimental Investigation of the Skin Friction of the Turbulent Boundary Layer on a Flat Plate at Supersonic Speeds (TN 2185, by Martin W. Reiss, Ronald C. Manock and Steven A. Varga)

The analytical portion of this report is intended to be a review of existing approximate methods for the computation of skin friction and heat transfer of a flat plate in supersonic flow. Further, the report investigates the effects of certain arbitrary boundary conditions upon reported by these existing approximate methods.

The experimental portion of the report presents additional data on high speed, turbulent boundary-layer, skin friction characteristics and compares these data with the calculated results of all theories.

The analyses show that there are extremely large variations existing in the predicted average coefficients and that these variations occur because of differences in the assumed mathematical boundary conditions.

An integral-table formula was developed from extended Prandtl and Vonkarm analysis for the average skin friction coefficient of an turbulent flat plate. This formula gave results which agreed with previous experimental data to within 5 percent in the range of Mach numbers from 1 to 2.5. However, when the typical boundary-layer velocity distribution obtained by experiment was compared with one calculated by the extended Prandtl and Vonkarm analysis, the profiles were not consistent. This indicates that perhaps the significant agreement of the experimental average coefficient, as efficient with theory was fortuitous. —DAA

► A Theoretical Method of Determining the Control Gearing and Tare Lag Necessary for a Specified Damping of an Aircraft Equipped with a Constant Tare Lag Autopilot (TN 2507—by Gregory B. Goss, Jr. and Albert A. Sclay)

This paper is an extension of an earlier Tech Note which discussed a method for calculating overall variations of airplane stability due to the installation of a particular linear autopilot. Purpose is to present a rigorous method to obtain combinations of control gearing and tare lag which will provide specific amounts of damping.

The derived method is applied to a typical airplane equipped with an auto pilot which applies rudder control in proportion to the regular acceleration in yaw.

The results thus obtained by this method are shown to be in excellent agreement with airplane motion calculations by the exact longer step by step procedure.

The investigation shows that for some values of control gearing, more than one range of tare lag exists for which the assumed autopilot control combination will have specified damping. The width of these ranges decreases with increased tare lags, beyond some value of lag, the ranges cease to exist.

The analysis is strictly applicable only to systems with constant time lag characteristics.

However, if a frequency response surface of one given autopilot indicates that a constant-tare lag autopilot is valid for a limited range of frequencies, the method can be used. For each condition, application of the method is discussed at some length towards the end of the presentation. —DAA

► Effects on Longitudinal Stability and Control Characteristics of a B-19 Airplane of Variations in Static Pressure and Control-Rate Characteristics Obtained through Use of a Booster in the Elevator Control System (TN 2218—by Charles M. Mathews, Donald B. Talavage and James P. Whitten)

The increasing use of control boosters in aircraft has led NACA to make flight investigations of a boost system installed in the elevator-control system of a B-29 airplane. On this airplane, elevator-force variations were felt to be most critical from considerations of landing qualities. The B-29 was chosen as the test airplane because it was representative of a large multi-engine inherently stable airplane elevator force variations, but having elevator forces that are somewhat high in relation to the present handling-quality requirements.

The test booster system had provisions for varying the magnitude of the aerodynamic force feedback over a wide range (in contrast to the alternate approach where stick forces are constant mechanically), and the effects of the magnitude of the pilot's stick force on the handling qualities of the airplane was investigated.

The maximum rate of control rate control also be varied to study its effects on handling characteristics of the test aircraft.

Specific test results on the B-29 airplane are presented. It is indicated that large stabilizer may have satisfactory handling characteristics with a booster having much lower available control rates than those normally used by pilots.

However, the NACA notes that this statement applies strictly to the test airplane. —DAA

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Ex-Cell-O's aircraft parts production facilities are being used now in conjunction with the defense program. If you are working with this program too, perhaps Ex-Cell-O can help you.

ABOVE: Typical precision aircraft parts manufactured by Ex-Cell-O. All details of assembled units were manufactured at Ex-Cell-O to customer specifications.

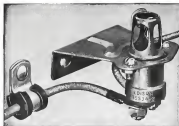
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NEW INTERCOM clears the air.

AMC Redesigns Plane Intercoms

Complete redesign of the inter plane communication system for bombers, fighters and transport aircraft has been announced by the Air Materiel Command.

AMC's Electronics Laboratory compares tested with those of the RCA Laboratories at Camden, N. J., in redesigning all the main components of the new standard intercom system.

► Pre-Amplifier—Indicates small amplitude of each crew station. Has amplified the central large amplifier formerly used. These units will act as pre-amplifier when the crew member is talking and as a signal booster for his microphone when he is listening.

Voice distortion and instability have been reduced by two devices. First, a moving and distance microphone and earphones have replaced the carbon mike and magnetic diaphragm earphones now used.

Second, the frequency range of the set has been increased to include the frequencies between 250 and 6000 cps. Former range was from 500 to 4000 cps.

These two changes are responsible for cutting down voice distortion and intelligibility by 95 percent, says the AMC.

Noise-coupling has been incorporated into the microphone to reduce distant sounds, such as engine and propeller noise. Either hand, oxygen mask, or boom mike can lead, depending on the operating conditions.

► Ear-Speakers—Earphones, the source of ear pain after several hours of flight, have been redesigned completely to

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make them more comfortable. The capsule itself is larger and fatter, an outer plastic shell means less than which are covered with latex rubber. A nylon cap over the assembly keeps the cold brass rubber from contact with the skin, and prevents the ear from sticking to the rubber due to suction.

The small covered metal bands have been replaced by a snap-on setting. Two plugs and cord used for the ear phones and mike have been reduced to one plug and one cord.

A helmet with harness empowers a national equipment. According to AMIC, the new system will probably depend on explosives only during take-off and combat. At all other times, a speaker system probably will be used.

Designation of the new act is AN/AG-10, eventually it is slated to replace all airplane communication sets now in use on fighters, bombers and transports.



Bendix Makes Tiny Airborne Amplifier

A tiny airborne amplifier, further emphasizing the aviation semiconductor system trend, has been developed by the Bendix Radio div. of Bendix Aviation Corp.

The amplifier is of the hand-pen type with a total gain of 130 db. It weighs less than two oz and requires 15 component parts. (Equivalent amplifiers require as many as 250 parts and weigh 14 times as much.)

Bendix says that a new circuit technique has been developed which permits reduction of electrical components by a factor of six. Capacitors and resistors have been reduced in number to the point where component failure will be minimized and reliability improved.

Tubes are permanently wired into the amplifier, the entire unit is designed to be replaced in the event of tube or component failure. Its physical design means that replacement of the unit is a matter of seconds.

AVIATION WEEK, May 21, 1951

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6031-1	B	9809
6032-1	C	9807
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Tough Duty Seal

A new type of flexible, reinforced seal, designed to permit effective sealing of shafts under severe extreme and temperature conditions, has been developed after two years of research and testing by Crane Packing Co.

Designed for use on rotating shafts in centrifugal pumps, turbines, positive displacement pumps and other applications the new part performs well in the presence of corrosives "never previously handled" by conventional seals of this type. Crane states it can be used at temperatures up to 500° F.

The high performance, composite type, can be cut into any size part to the use of a Teflon "wedging" in place of leather or synthetic rubber rings. Teflon, at the three points, is highly inert to corrosive chemical action, is flexible and withstands extremely high temperatures. As the composite expands it, the wedging causes it to seal to the shaft, the chemically inert properties of Teflon with flexibility and positive sealing features essential to effective mechanical sealing. Address: 1900 Cuyler Ave., Chicago 11.



New Airport Radio

A mobile, VHF AM two-way radio package, complete with antenna, power supply unit, control knob, speaker and hand microphone, has been placed on the market by Communications Co., Inc.

The equipment, Model 275, will operate off any dc power source. It sends and receives on the 118.1 MHz channel and has an output of 3.4 watts.

Built specifically for permanent installation in airport vehicles, it embodies design features based on information gathered from airport managers throughout the country, Crane says. The set meets the need for a compact, low-distortion radio of this type, drawing only 7.5 amp at standby and 15 amp while transmitting, the company claims.

The great change, which can be mounted where desired in the vehicle, carrier receiver and transmitter sections and radio power supply. The latter is a

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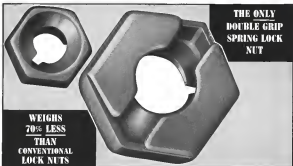


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- Highest Prevailing Torques
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- Excel in Vibration Tests
- Excel in Tensile Strength

This nut can now be first choice for all aircraft non-structural and secondary assemblies. Weighs 70% less than conventional lock nuts. Remember, it's the only sheet metal nut with a double spring lock. Unexcelled by any other. And it's in production NOW in all five popular sizes.

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MATERIAL SAE-1060

SCREW SIZE	PART NUMBER	A	B	C	D	E	MATERIAL THICKNESS F
1/8-20	M 350-1	3/16	7/16	5/16	3/16	.200	.020
10-24	M 350-2	5/16	5/8	3/8	3/16	.1875	.020
10-32	M 350-3	3/8	5/8	3/8	3/16	.160	.016
8-32	M 350-4	5/16	7/8	3/8	3/16	.125	.016
6-32	M 350-5	3/8	5/8	3/8	3/16	.140	.016

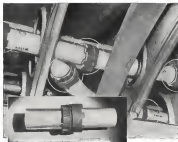
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In service use over extended periods, often under extreme conditions, FR pipe connectors continue to maintain a satisfactory joint which rarely requires servicing. This lightweight connector does the job of a heavyweight and, in addition, offers certain advantages not shared by any other pipe coupling method.

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FR-3125-57100-100



FLIGHT REFUELING INC.
Specialists in Aircraft Fueling Systems and Equipment
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heavy-duty, non-pneumatic tireless type which classifies dimensions and other starting equipment. Conco parts out. The speaker is oriented in opposite case, and control head with microphone is opposite from main chassis. Weight of the entire installation comes to 25 lb.

Another version with the same performance is the PM-273 (portable mobile) model which contains all equipment, including speaker and control, in a compact carrying case provided with a handle. This unit can be used for temporary installation in vehicles or wherever its use is desired. Weighing 15 lb. complete, it is set up for service by connecting two battery wires and the antenna.

A third version, Model FX-273, with a slightly higher output of 4.5 watts also is produced for the Air Force and is designed for base station or emergency use. All parts, except antenna, are compactly arranged in the same portable case with handle used for the PM-273 described above. This set, however, operates on 115-volt AC line current. The firm's address is 928 Getco Ave., Good Lakes, Pa.

Fixing Frequencies

A frequency standard, suitable for ranging gyms, seal coasters, controlling aviation, astronautics and other equipment, is being marketed by American Time Products, Inc.

The device has an output power of 10 watts at 115v at any specified frequency from 50 to 500 cycles. Accuracy is $\pm .001$ percent in zero temperature ranges. Sets also can be furnished having high accuracy over wide temperature ranges. Output specification: input power for the unit is 45 watts at 115v; input 50 to 500 cycles.

The unit measures 6 1/2 x 7 1/2 x 2 and weighs 14 lb. Address: 550 Park Ave., New York 17.

ALSO ON THE MARKET

Important development in Allison's line of turboprop engines is a V-1222 "intermediate" model in vitified aluminum-aluminum case and measuring only 175 in. dia. and 5 ft. long. The engine is rated at 2000, dc., 1100 hp, and can operate at 1080° temperature, very compact. Allison Corp., New Bedford, Mass.

"Fusor-prop" metal goring line "berthed" and/or in general slipping along the case and, generally, with the prop conditions exist. Particularly suitable for turbojets, turbofans, turbofans and the like. Made by Ruston Inc. Works, Inc., 110 East 130 St., New York 35.

PRODUCTION



MACHINE TOOLS at Air Force storage plants in Omaha and Minnott, Co. (left) —



MAINTENANCE to speed industry mobilization. Half the work has been liquidated.

Tool Reserve Speeds Mobilization

Over \$2-billion worth of stored equipment already shipped to manufacturers from two AF plants.

Denjoy—Machine tools valued at over \$2 billion are being shipped out of the two Air Force storage plants at Minnott, Co., and Omaha, Neb., to serve as a formidable extra asset in the mobilization of U. S. industry for increased or new production.

An Materiel Command's Production Resources Division has put a conservatively estimated value of \$10,000 a tool on the 20,000 tools which have already been sent out from storage to USAF contractors for plants. About the same number remain to be shipped.

► Tools for Douglas-Aircraft engine makers are getting away of them as they look up to meet postwar production. Approximately 1900 tools are going to Alcoa, 1200 to the Chev-

rolet plant at Torrington, N. Y., where Allison J-35-A-25 jet engines were to be built. (None of it is planned to build Wright R-3500 piston engines there because of the postponement of the first engine Boeing B-70C into which the Allison engines were to go.)

First in getting ready 1800 tools for the Pratt & Whitney R-4360 piston engine production at Chicago.

The Thompson Co., which is the contractor handling the shipment of tools from Government Aircraft Plant 1 (Oshkosh) and Plant 5 (Marion), reports that shipments have been leaving at the rate of 600 to 700 a week from Minnott and about 500 a week from Omaha. Shipments are going to other contractors for Air Force, Navy and



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OF COURSE NOT! Literally, their normal body temperature is 98.6—same as laborers, engineers or any other group of people. And, figuratively, they're no more, or no less, cold-blooded—as a group.

We all know unreasonable generalizations can be dangerously false. Common sense and on-the-job experience show us the value of dealing specifically with ideas, problems—and people.

Let's not make the big—and costly—mistake, then, of generalizing on religious or racial groups. Adopt and carry out these common sense principles:

1. Accept—or reject—people on their individual worth.
2. Don't listen to or spread rumors against a race or a religion.
3. Speak up, wherever we are, against prejudices. Work for understanding.

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EXTERNAL SURFACES of tools are cleaned by high pressure solvent spray before...



DEMANTLING GEAR HOUSING for thorough cleaning of shafts and extreme parts

Obsolescence as they are needed, and are not being held for Air Force construction exclusively. But the bulk are going to Air Force contractor plants.

►**Half Ready**—Approximately 50 percent of the steel tools had been prepared for penetrators and now are ready for use with motor repair or race at all. Many of the others require more extensive rebuilding. In most cases, the rebuilding is not being done by the original manufacturer. These items are heavily loaded with new, additional machine tool orders and asked that the rebuilding jobs be assigned to other plants.

Getting an extra push to the movement of tools out of Marett's is the fact that Lockheed Aircraft Corp. is moving in as fast as the tools are moved out—and would like to move in even faster. A recent check at Marett's indicated that Lockheed already had well over 1000 workers, and was well under way on its first program to modernize World War II B-26.

Principal modifications on the B-26 will be substitution of new engines, up-to-date electrical equipment, and complete exhaust overhaul. But the B-26 is only a temporary program and the

Marett plant can be placed into planned B-47 jet bomber production, along with the Boeing Wichita and Douglas Tulsa plants.

►**Penetrator Parts Off**—Penetrators used on the steel tools have proved very satisfactory, a spokesman for the Turquoise Co. reports. Importance of a thorough job of cleaning the tools before applying the penetrator has been emphasized by discovery of a few tools—that had not been well cleaned—whose surfaces had gone on under the penetrator.

Fast penetrator programs need a heavy duty material, designed by service manufacturers as ANS-12 and ANS-073. More recently a very fine coating material designated ANS-4719 and similar to the commercial product known as "Rust Avoid," has been used. This newer penetrator is understood to have a longer base, and is suitable on opening oil. The penetrator itself has excellent lubricating quality, so that a five-hour test run of a machine tool using the penetrator is a lubricating oil was successful, the Turquoise spokesman said.

►**Final Check Important**—A spot check with a few manufacturers on machine

*A Report
to Aviation
Engineers...*

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On right 60" x 90" For CECOSTAMP



- Wider Range of Work:** The Model "L" CECOSTAMP can handle a wider range of work than previous models.
- Easier Operation:** Concentration of controls makes for ease of operation.
- More Accurate Operation:** Valve packing and valve tapping give smoother, more accurate action.
- Greater Safety:** Operational hazards have been largely overcome. Controls are arranged for safety and ease of operation.
- Lower Maintenance Costs:** New shock absorbing features have been incorporated to cushion vital parts.

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CHAMBERSBURG ENGINEERING COMPANY

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tools they have received from the program indicate satisfaction in most cases. Importance of selecting the proper tool to do the job is one of the points most emphasized by the Air Force. There are number of cases of manufacturers ordering from Air Force description machines tools which proved unsuitable on arrival.

Some manufacturers have indicated a desire to read their machine tool operators to the CAP storage facilities to select their own tools. Until now, there has been reluctance by USAF to complete the shipment program further by this procedure but it is understood that there have been a few cases in which it has been permitted as manufacturers with very large shipments request.

The tool retains the property of the government while in use by the defense plants, and are subject to return to the government at the end of the emergency.

PRODUCTION BRIEFING

► **Robert Corp.** has completed two new saw quarters in 1350 Victory Blvd., Glendale, Calif. Former address was Grand Central Airport. Need for additional space for work on military capital projects necessitated change.

► **Topknot, Inc.**, has been granted exclusive rights to install and use its light plane diesel engines up to 500 hp, by embodying patent inventions of Jerome Barak Power, Inc. Immediate development is planned by the Company, Ft. Worth, Texas.

► **Curtis-Wright Propeller Division** received safety awards in its design awards for compliance since that an engine man-hour without a single lost time accident. Awards were made by New Jersey Department of Labor and State Safety Council.

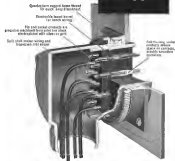
► **Aviation Accessories, Inc.**, Ft. Worth, has expanded aircraft electronics production facilities with completion of a 75,000 sq. ft. building.

► **Independent Passaic Tool Co.**, Newark, Ill., has purchased Armstrong-Walworth & Co., Passaic Tool, Ltd., Gorton-on-Tyne, England. The British firm, employing 750, became an affiliate of the purchaser's English subsidiary, Independent Passaic Tool Co., Ltd.

► **B. F. Goodrich Co.**, Akron, Ohio, expanded its design departments by several thousand square feet, and its plant space has been reached 472. It is estimated that 550 will be employed when peak output is attained.

Here's why those in the know
—demand

CANNON PLUGS



Recognition of Cannon's 35 years of sound engineering and fine manufacturing experience has built the demand for Cannon Plugs. Here we only in quite look at the latest type "K" (K) Cannon Plug, because of the Air Force's choice. Here is the "K" type you should use the "AN" design than any other connector.

Continued approval on the work, Type "K" is now used for numerous applications such as aircraft, auto, automotive, marine, power sources, machine presses, airplane

and aircraft and widely used throughout the electro-mechanical and electro-mechanical fields.

The design and construction details in the Cannon "K" design are typical of the fine Cannon sales to provide more than 10,000 precision, multi-million connections to meet the exacting needs of industry.

We will gladly send you engineering bulletins describing each of the many types of Cannon Plugs if you will kindly describe your application.



Diagram at left shows how the fine precision of each cone on the high "K" work makes the work go more smoothly. Type "K" connectors have been tested.

CANNON ELECTRIC

Box 1118
Cannon Electric Company
Los Angeles 31
California



Type "K" and "K" connectors are used when a steel work having a dimension (shown here) over .001 (100 times as much) is required. The "K" type is used. The "K" type is used when a dimension (shown here) over .001 (100 times as much) is required. The "K" type is used when a dimension (shown here) over .001 (100 times as much) is required.



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Wires can be added or replaced un-
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Spring tension prevents accidental opening.
Resists moisture proof standard
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EQUIPMENT

ATA Engineering & Maintenance Trends

Meeting Seen Increasing in Value

Plus factor found in thorough preparation which gives an airline new information on its own operations.

Used test of the effectiveness of an aviation technical meeting is how much new or confirmed knowledge that attending take away with them. As the model An Transport Area Engineering and Maintenance Conference in Chicago last year found out, additional benefit was pointed out by one of the delegates of a major airline.

He said: Cost of the meeting to an airline is more than justified in the amount of savings of its own operations prepared for the conference.

How thoroughly the participants had prepared for the conference that year was repeatedly stated during the session, the final report on which follows.

Propellers

In discussing steel bladed propellers, engineers agreed that increasing shaft thickness contributed very little to making the blade less critical, increasing the weight of the blade requires heavier hub and reduces blade pitch change rate by up to 30 percent.

Opinion was divided on the use of torque wrenches for tightening prop shaft nuts—NWA uses the tool on all its propellers, UAL and PAA on the Boeing only. FAA claimed that in spite of this, nuts still loosened, causing problems for the carrier.

Dynamite Balancing—Concerning dynamic propeller balancing, Douglas stated that it was desirable on the DC-3, from the passenger and crew standpoint, because the fracture was responsive to propeller vibration frequencies, as was the control column. Prop balance is no problem on DC-4 and G aircraft provided it is within the limits recommended by the manufacturer.

In reply to Hamilton Standard's question whether manual loosening of feathering is operationally feasible, EAL replied that it had used manual transmission for two years. Initial the carburetor switch was usable and had no experience with feathering levers. Douglas also noted the trend in being no subject. Elmer Standaert replied that the military uses it extensively and successfully and USAF agreed.

Still on the feathering subject, Lockheed spoke against pre-owned oil. The

risks relative to reducing sludge formation in the prop drive and hub. Now does it know of any instance when prop drive sludge prevented feathering.

Covering other aspects of propellers, Elmer Standaert made three recommendations. Avoidance is preferable to and each to detect blade cracks. Indexing of retarding case gear every 2000 hr. to equalize wear quadruple gear tooth life.

And it was agreed by the carrier that putting new nuts on it every overhaul was the safe practical way to reduce external oil leakage on the 43000 propellers.

Engines

Much of the engine discussion involved oil. Airlines disagreed on the question of changing oil between engine changes or running it the full engine time.

EAL changes oil every 400 hr. on its Coesco, or within 4000 oil. Bart also advocates oil change, EAL's eventual neighbor at Miami, PAA, concluded that changing oil is unnecessary on the P&W R-1090 and R-2500 engines. Current evaluation of the R-4500, though not complete, indicates that the same may be true.

Outgoing GM's criticism and practical approach to the development of additive and detergent oils for aircraft engines will result in great strides being made during the current year, engineers believe. Among problems mentioned to date have been deposits of metallic salts in the combustion chamber, soot in particulates, and oils which kept the engine beautifully clean (don't provide valve guide lubrication. P&W has reported one detergent oil.

The consensus on detergent oils gained decisively in light of the agreement that oil sludge is one of the major contributors to engine failure. Where checks of deposit build have, anything can happen. Oil dilution is dangerous because it can cause part scale build-ups. A recent report of engine and failure was attributed to this.

Development of detergent oils is directed toward elimination of sludge. Another approach is design of oil sludge coagulants. Thompson Products will

it will tend to shakedown at present, but Wright Ann's work along this line is continuing.

Wright is also encouraging the use of "chip detectors" in engines although they do give erroneous false warnings from water contaminants or electrical leads. It is currently testing a Swedish made (Avrover West May 13, 2952) KLM's piston equipped with chip detector was too many false warnings, and tests have been avoided.

EAL is testing the detector, but has left all the warning lights in the cockpit.

Most R-1510 engine operators agreed with Wright's present study to reduce to a minimum oil consumption in the

fuel injection line. WAC said that a configuration changing over 30 seals will now be ready for test.

Wright is combining master and bearing failures on the R-1510 B&B engine by comparing against an accuracy of dilution, dividing several different types of crank pin plug investigations to prevent sludge from breaking loose during dilution (TWA is testing the different types). The manufacturer hopes soon to release one of a few seals scores which, experience shows, reflects an amazing number of contaminants.

The problem of cracked cylinder hold-down flanges is directly related to engine trouble, PAA believes. Flit-

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ing graphs of system failures vs. time failures revealed identical curves, repeated only by a time element.

The system on engines was highlighted by a complete report on the R-1550 B31 engine delivered by J. J. Ludvigson of Wright Aero. The engine points:

• **Comble pin hole wear**—Wear shows up at average time of 3000-5000 hr., consistently at 1500 hr. depending on that portion of the part. Repair open up hole .005 to .015 in. and use even size hole pin.

• **Fluting inside pin hole**—WAG recommended abandoning this practice, longer life can be obtained by retaining oil to original condition.

• **Canting cylinder hold-down design**—In all cases of cylinders returned to Wright, removing sharp edges to give more generous radius will decrease problem.

• **Pinion ring groove wear**—Since most engines go to 4000 hr., Wright does not consider this a major corrective action. Nickel-plating groove, using hardened stainless steel rings, lengthening of screws starts show promise.

• **Control valve housing replacement**—WAG is opposed at the moment. Problem is to provide seal consistency with high pressure lubricant which has not yet been found. WAG is currently

designing new seal with lower oil test stress.

• **Twisting tail shafts**—Modification call for holder angles and longer tail shafts has been proposed. Coming up are wider teeth for speedspike drive pins and slower blow shaft. Wright is sure this will solve the problem.

• **Engine roughness but no mechanical malfunctions**—EAL is investigating this problem.

KLM suggested that exhaust valves might be sticking, gases cooled. WAG suggested that smoke trouble occurs during summer operation, or is BMEP laws might be too thin or fuel could be spraying.

EAL replied that they could get away from trouble by opening cold flap or applying primer.

• **Heatless positive-stitch solution** is installation of trap tanks. To avoid in-flight oil segregation, Wright is experimenting with return line to wing.

• **Carburetors**—FAA says it cuts 99 percent of its carburetor problems and also saves 50 man hours by removing the regulator vent only and vent the throttle body. FAA says carburetor costs of this scheme is low.

Carburetor screws on the R-1580 above 20,000 ft. are being brought on air control by using a 49-in. control

of a 47-in. bleed in the carburetor. This serves to restrict the suction PR-W has a new setting which seems promising.

• **Exhaust Systems**—Get exhaust stacks on Conquest are giving good results, according to KLM which has more than 2000 hr. on them. EAL is also pleased, but not sure this problem. Jet stack gave cooler lead temperatures, so cool flaps were closed. Result solves burned Solentus axial heater to prevent cool flaps from being closed more than 90 percent of total time. Lockheed also will conduct jet stack tests on O-15 Constellation.

Except for using orifice restrictors, Wright said that there is no minimum temperature requirement on the R-1550 because of fuel injection.

Asparagus tubes, once a major headache of Conquest 240 operators, now have a service life of from 2500 to 3000 hr. according to WAG. Close inspection and welding small cracks as they develop help to prolong asparagus tube life.

Conquest stated that afterburning proved to be very detrimental to asparagus tubes. Monitoring position and carburetor within asparagus leads can result in excessively longer asparagus life.

Conquest noted exhaust stacks were

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shipping engine accessories to one of our factories. Douglas complained that current designs do not permit retro-
action in flight, and concluded that you "may actually... substitute one
board for another."

•Batteries—TCA reported that the
RAF is using alkaline electrolyte bat-
teries almost exclusively and finds them
ideal. Weight penalty is 10-15 percent.

American objectives were met too
much, and specialized ground equip-
ment, slow discharge rate maximum.

•DC power—Douglas favored gen-
erator and alternator constant speed
devices. NWA says the GE units are
dependable.

Genie shaft in form of Eclipse-Power
generator have been found to in-
appropriately adjusted voltage regulator,
according to General E.P. again.

Relative to de-energize controls,
Douglas recommended the installation
of emergency relays and heavy duty
contactors (Ransome T1-2) or equip-
ment capable of opening the circuit
under high voltage and current condi-
tions.

TCA is modifying its fleet to resis-
tance full protection against overvolt-
age ground fault and fence fault.
Connections was desirable as protec-
tive devices are, software can substitute
for good primary design and installa-
tion.

•AC power—Best known remedy for
transformer explosion and smoking
upon failure is use of new solid, in-
tensely fused transformers such as
Pomco's DW-37.

•Lighting—Corcoran said that inter-
national light bulb usage was erratic.
NWA and UAL agreed that fluorescent
lighting is good and replacement of
lamps is almost nil.

UAL is converting all aircraft to in-
corporate 50 frames minute flashes on
all identification lights and is thinking
of installing a 2 1/2 lb existing battery
on top of the fus.

•Switches—The Micro Switch problem
was again raised. UAL contended that
the heretofore used one, tested on
the DC-10, is worth the high material
cost. Mayr felt that conversion of Micro
Switches was not so much a fault of
the switch as it was of the installation.

Next action agreed that micro-
switches work well if treated well. They
also indicated preference for "isolated"
"cocked" relays rather than un-
grounded because latter cannot be
overvoltage occasionally. FAA says
wrecks of each depend on application.

•Wiring—Telford got the nod as being
the consultant that gives the best service
in engine applications (not including
avionics). Bates stresses steel also
came in for favorable comment.

Nylon pickled wire has proved to be
satisfactory to date for use in engine



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sections. It is also the only cable which
successfully meets Skytel (Aviation
Wire May 7, p. 17). Best wire con-
struction for this application, according
to Douglas, is tinned copper, extruded
polyvinyl chloride, Fibroglas braid, ex-
truded polyvinyl chloride, extruded
Nylon jacket. Douglas lists two approved
sources for this cable: Scarpement Mfg.
Co., 199 Washington St., Boston, and
Reider Mfg. Co., P. O. Box 5170A,
Chicago 86.

Douglas listed these as the finest jet
and type of the constant wiring with
which it has had experience: RadioShack
"Vitroco", Packard P.H. 408, and Gen-
eral Electric.

Fuzones is the highest temperature
wire known to Douglas. Composition
is nickel clad copper conductor, lead
sheath, asbestos braid silver colored
finish, all silicone-impregnated and
braided. Cable will withstand conductor
temperatures of 750 deg. F., according
to Douglas which listed the other wire
maximum temperatures at 500 and 500
deg. respectively.

• **Control protection**—Current protection
is provided chiefly by wiring, airborne
manufacturers agree. Some protection
is now given gun fight environments,
and internal protection for their units
is provided by some equipment manufacturers.

Considerable discussion revolved
about circuit breakers. Some airlines
contended that tests showed sensitive
fuses' shunt leads are not met by the
product. TCA agreed that low amp
breakers were impractical. Spencer
Thornhill pointed that in a develop-
ing business for emergency use as
1 and 4. Heaton Electric is going
down to 10 milliamperes.

Consensus was that reset breakers
should be tested periodically. Some
units that did not meet requirements
could be made to conform after a few
movements of the switch.

Many airlines and aircraft manufac-
turers expressed that "passivated"
electrical terminals were desirable.
Many are standardizing 100 percent on
these terminals.

Structures & Controls, Interior Furnishings & Equipment

This session has always been char-
acterized by the number of subjects
discussed—from landing gear to water
systems, from oxygen systems to paint.

These are some of the problems and
solutions:

• **Consistently**, direct of any consequence
are not tolerated at the leading edges
of DC-6 aircraft for aerodynamic
reasons.

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used a web primer and Vinyl top coat system. These are supplied by United Chlorocres, Inc., or Assenmet, Inc., of American Pipe and Construction Co.

- For floor structures, both joist and rafter, the surface manufacturer recommended treatments of metal sheet backed up by welded or extruded aluminum or steel members. Stainless steel or titanium were recommended for belly caps compartments, and plastic sheet was proposed as covering of curved floor and cargo areas.

- A good method for treating lightly corroded aluminum is to remove all aluminum with moderate amounts of weak acids, such as phosphoric and hydrofluoric. After rinsing, polishing may be necessary for appearance's sake.

- Douglas says that TST has proved very satisfactory on the DC-6. Being a higher strength alloy it requires more care in design, fabrication, heat treatment and handling.

- The company has developed a ball bearing alignment staking method which it says will be more efficient than the old method of holding bearings in place because it will allow more bearing replacement and cushion stacks, will reduce tool maintenance cost and give control of depth of staking.

- Douglas knows of no instances of Azurite down opening in flight where the positive detents have been positive.

- Douglas uses both Zygle and Dy-Chek methods of inspection, depending on category of part and type of inspection.

- Zygle is used for castings and forgings, machine parts, cylinders and weld assemblies.

- Dy-Chek permits a convenient to inspect questionable heat spots, to determine end of a crack, to locate stop hole and for examination of machined surfaces where removal of dirt is a problem.

- An extra coating and side wall being material, Vinyl has the edge from a maintenance standpoint, and galvanneal or hot-dip zinc are excellent standards.

- To eliminate burning of structure, efforts and under wire tabs, Douglas recommends proper installation of tab drum boots on DC-4 and 6 planes.

Ignition

Highlights of the ignition session were:

- A fully and accelerated exhaust system analysis, that was undoubtedly reduce maintenance cost and fuel, is being regularly. TCA took an air analysis is justified for test airbases and an well-known component such as the DC-3.

- Fuel improvements in spark plug design resulting in superior product meeting key money. Thus, coupled with the

booms ignition systems, have contributed greatly to reduced ignition maintenance and malfunction.

- Spark Plugs—A body discussion took place on the condition of new or remanufactured spark plugs. TCA says the fixed on plugs are the trouble maker. Pa-W warns either an improvement in plug cleaning equipment to permit better cleaning of current plug designs, or better plug designs to permit proper cleaning with current methods.

- Igniters agreed that plugs tended to foul more readily in water injection systems than in dry ones.

- Hanes—Packard has developed a new type of high resistance ignition cable consisting of a fused fused core (inorganic) core system, Avconco. Wires Sept. 18, 1950, equipped with graphite. Resistance is 4000-7000 ohms/ft.

- Bought out primarily for automobiles to reduce television interference, purpose of the cable is to prevent high-frequency radiation, then reduce plug erosion. NWA explains that this test revealed erosion rates comparable to those obtained with low resistance ignition systems, but admitted the spark was weaker. That could pose real weathering problems.

- EAL announced that it replaces the Scintille low tension ignition because its 20 Coaxial every fourth engine change and is going to the 14th.

- Scintille has a lead wire on test which will give still better service, it says. Wire and research on selected higher temperatures. Wire used at 7000.

- B-450 engine operation report that Tardis ignition because as that engine was giving good service except for the mechanical problem of firing failures.

- Anshen—PAA and TCA strongly questioned engine analyzer. PAA the engine engine analyzer (especially the Sperry unit), while TCA spoke up on favor of the ground engine analyzer. TCA is modifying its entire fleet to use the ground analyzer. It will use Scintille components, though except for the analyzer itself, which will be a British unit.

- Scintille is set aside on the idea of an engine analyzer which includes vibration analysis, therefore has devoted its efforts toward development of an ignition system. It added that TCA's decision justified Scintille's thinking. TCA pointed out that its policy of airborne vs. ground analysis was influenced by the fact that some of its fleets carry a flight engineer to operate an airborne installation.

- PAA offered their statistics as good fuel engine analyzers are time and money.

- Savings during first year of operation on Convair's 5700 sq plane.
- Savings on Boeing 377: 150,000 per

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year per plate. This a conservative estimate produced on 3,000 period.
•Saves out of tooling and fixtures were reduced by 50% as the analysis, using a cylinder change instead of a positive engine change. Analysis saved at least 5 cents in Pacific device.
•Ignition troubles do not cause delay by more.
•Analysis may be used to trouble shoot heater and turbocharger engine trouble.

•With analyzer closed the aircraft, flight engineers can write up trouble while plane returns to hang (if ideal) or have time study and writing for maintenance of the instrument of a trip. Mechanics normally can proceed directly with correction of trouble without further investigation.
•The unit permits present possibilities for increased accuracy and widening range of applications.

Scottell stated that if facts substantially right, the program could be obtained with an analyzer.

TCA, believing itself to be the first to solve to correct 100 percent of its fleet to analyze, estimated that it would achieve 90 percent of FAA's concerns. FAA thought this a bit optimistic.

Primary motive behind TCA's decision on conversion was preventive maintenance. After exhaustive investigations and cost analysis, the carrier decided that ignition analysis was economically justified, not only on the North Star, but on the DC-8's. Reduction of plug removal alone would come close to wiping out the installation. Again, the airline's engineers felt that the Seaulls equipment clearly suited their requirements.

TCA's cost for analyzer installation North Star—about \$100,000 and 110-120 man hours. DC-8—about \$700,000 and 75-80 man hours.

FAA said that training on use of analyzers consisted of a 5-to course backed up by 6-to refresher.

Scottell's engineers indicated that the cost of their analyzer varied considerably but cited these figures as being typical for a complete installation on a DC-6: \$7,800 for equipment, 85 man hours for installation, total direct cost of less than \$7,000. Scottell added that it has established a training school on Sidney with courses designed for both operator and the maintenance crew. Course runs five days, 40 hr.

CAR has a similar analyzer and finds it meets considerable trouble-shooting time.

Instruments

Analysis agreed almost unanimously that simplification of instrument maintenance records as an ATA project would be beneficial to all concerned.

Several carriers including UAL, have taken steps in this direction within their own organizations.

Some precautions against Brando tube explosion in the cockpit are FAA rules under tube with UAL and NWA make their own analysis, another on design data made by Operating and Maintenance Specialist Co., Channahon, N. C.

Virtual gas accumulation error has reached its apex. It exists from a chemical, accumulation, short circuit, and wire error.

Engineers were in almost complete agreement that instruments should be plain black with white dials (not fluorescent), illuminated with both red and white light. Navy has already stated on this scheme and USAF plans to do the same soon.

Advantage: air white controls on black face gives maximum contrast. Red light helps prevent night vision. White light provides visibility in lightning storms. Two systems provide protection in case of lightning blast.

Carrier using the Sperry Zero Reader says it has been trouble-free to date.

Lockheed came out strongly for high-gain resistance-type thermocouples for engine cylinder temperature indication, citing their superior zero weight, elevated special non-constant carbon, special peak and minimum, and long-term stability, simultaneous air temperature indication to maintain type.

NAL's D. Chase made this observation concerning instruments as general systems in flight instruments might well apply to engine instruments. Some systems with over-modern, trouble-free equipment.

NAL observed that although precision and maintenance cost of electric and air-driven gauges is about the same, the former is proving to be much more reliable.

In reply to a complaint that cover glasses on the Sperry H-5 cockpit stopped up, Sperry replied that limited. New glass should not get into contact are disturbed at installation.

Other carriers noted the Edgipus 12491 and 13991 boronized experimental carbon diffusion due to requirement. TWA found the trouble in comparison of the ball bearings. Edgipus a strong to find non-magnetic ball-in-die but are plated bronze cases.

•Automatic Pilot—Both autopilots used by commercial carriers—the Sperry A-12 and the Edgipus Pioneer PB 10-6 were greatly improved in reliability during the past year. The last legs are being worked out. "Regardless" tubes at the amplifiers are helping greatly.

Edgipus admits that the automatic altitude control is still a problem, but much work is being done on it to make it acceptable.

Engineers agreed that it was desirable

to check stick forms on the PB-10, although check is difficult to perform. Commercial stick check should be made at every amplifier or stick change (some restricted this to elevator axis only).

Fuel and Oil Systems

In the discussion on integral fuel tanks in bladder cells, the ATA committee dated maintenance requirements submitted that attractions for either type were very low. Over a six-month period, the highest rate for integral tanks per 1000 hr. of aircraft operation was 0.71. For bladder cells 1.41. However, bladder cells had a record of four consecutive months with no interruptions. For the same period, integral tanks averaged about 0.15. One problem of integral maintenance—defueling source of a leak.

Contributions received on the production line are having their tanks sealed with a water latex polyurethane. See report AF 5013, Navy 52122 and SAC 1-745. Lockheed is trying to eliminate the spray method of application to reduce amount of material required.

General impression of those who attended this conference was that it was better organized and more information was presented in better fashion than at any previous meeting. There was one underlying question: Is the conference becoming too big and unwieldy? Next year promises to bring about major individual changes.

Recorder Lists To Test Pilots

A memorandum was received, read and signed enough to withdraw being wrong out in test air assault, is being manufactured by the Rock, Ltd., Edgipus, Middlesex, England.

The assembly controlled unit is a quarter the size and a sixth the weight of conventional size recorder. It can operate continuously for an hour.

Expense is to reduce, but subject of the maintenance and difficult (especially during extreme maneuvers) task of setting notes as a log pad. With the new recorder, he can get a running consistency of his observations and reactions with a minimum of trouble. These are used in conjunction with, filmed records of flight instruments, stream strips and other test equipment, maintenance being done by means of chronometer.

The equipment and lightness of the recorder make it ideally suited to lighter installation where space and weight are at such a premium.

Rockwell Aircraft assisted in the development of the cassette recorder.



MAXIM HELPS SOLVE TOUGHEST JOB YET

LOCKHEED-MAXIM DEVELOPMENT, MILESTONE IN INDUSTRY

Here for the first time a jet engine installed in a plane is being silenced successfully during run-up tests. At the Lockheed Aircraft Co. in Burbank, final adjustments can now be made without the deafening roar that has been such a hazard to technicians' hearing and health.

The ship shown is the new Lockheed 7-94 which has a turbo-jet engine equipped with after-burner. Maxim is proud to have worked with Lockheed in helping to solve this major problem for the industry. Maxim is proud to chalk up another "fit" in the progress of silencing.

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AIR TRANSPORT

New Civil Air M-Day Plan Ready

Role of transport industry will be spelled out as soon as several key positions are filled.

By F. Leo Mason

The billion-dollar-plus civil aviation industry has work yet to do as active war mobilization plans, an office, and a director.

Within another week or so the arm and the office may be ready to start working. How you want modify your plans for war use, what you want do with your planes and facilities on Mobilization Day, what lay personnel you may keep a case of war, and what equipment and replacement parts you should build on a stand-by basis for M Day remain.

Top civil air mobilization director is seeking CAA Administrator and World War II military director of U.S. Civil Aviation, Maj. Gen. Donald H. Canfield. He is currently Robinson's Assistant Deputy Director. Canfield may have the title of Assistant for Civil Aviation Mobilization to the Undersecretary of Commerce for Transportation. This issue the Undersecretary DeWitt Hensler has delegated an mobilization function to Canfield (Aviation Week May 14).

Canfield will have a deputy and five direct underlings. Titles are Director, Air Transport Division, Division, General Operations Division, and Director, Airports and Airways.

Names of the mobilization chiefs were not released last week, but here are the type of background they will probably have. Deputy Mobilization for Canfield—a man high in civil-military coordination activities, such as Air Coordinating Committee, Transport Director's civilian position, General Operations—a man experienced in both government work and personnel operations, like a state aviation commissioner, Airports and Airways—a top man in CAA for civil airports and airports.

The director will run mobilization and allocate facilities of the three phases of civil aviation: transport, field base operation, overhaul and maintenance bases, structure and agricultural and private aircraft, and airports and airways.

Here's what each will do:
• **Transport Director**—The Air Transport (Mobilization) director will coordinate the mobilization of the air transport industry and U.S. air carriers, scheduled and long hauls.

His job: To coordinate and cooperate with the military agencies, the airline industry and the affected civil agencies, he will plan and place in operation a program to insure the maximum utilization of the nation's civil aviation resources, except six centers, provide facilities available to the military for training and flight and ground crew and related instruction, provide for overhaul and maintenance of both transport and other type aircraft.

Specifically, he has charge of mobilization program involving:

- **Training** and maintenance facilities
- **Overhaul** and maintenance facilities
- **Parties** in the air transport reserve as military
- **Assets** war use of civil planes for air

traffic, an evacuation of urban centers; losses and cargo duty; local transport of national regions and personnel.

• **Allocate** use-transport type planes for military, after determining their requirements.

• **Allocate** personnel for civil overhaul and maintenance bases, including those operating under military contract. He will do this by setting up a system of personnel allocation and determining emergency requirements of all "general operations" under his direction.

The General Operations Director will also control mobilization of all civil planes and maintenance facilities except those of the airlines.

• **Airports**—The big task of the Director of Airports and Airways Mobilization is to coordinate the civil and military.

Specifically, here is the job assigned the Airports and Airways Director:

- **Coordinate** mobilization program for airports and airways between civil and military interests
- **Execute** a specific program for use of airports and airways for military use
- **Secure** security of the airports and airways
- **Coordinate** responsibility for wartime operations of civil airports and airways facilities of the military
- **Execute** contracts for joint use of airports by civil and military and so the plan will be definite before the M-Day task. This is to be done in coordination with agencies having statutory responsibility for operations and construction of airports and airways.

This director is supposed to resolve the peaking and backing on civil-military sharing of airports and airways. When he gets it worked out, he will be responsible down to black and white, so operations will be smooth when the emergency happens.

• **Mobilization Office Set-Up**—The new Civil Aviation Mobilization Office, under the Commerce Undersecretary for Transportation will have its key men, according to current plans. Undersecretary Robert Assistant for Air Mobilization. Canfield will directly his vice assistant, Robinson's executive assistant, Charles Longman, and the three division—Transport, General Operations, and Airports & Airways—its six assistants. Air Coordinating Committee Executive Assistant Charles O. Gray is doing a lot of the planning.

To see how Undersecretary Hensler's office fits into the big picture as civil air mobilization, see the acquisition chart in Aviation Week, Mar. 24, p. 65.

Aside from executive operations, the mobilization office will also have a section for planning and preparing program budgets, budgets, and studies, and a legal advisory staff.

There are also plans to have an ad-

way issued or considered that meets when Chaucy has a problem. Presumably, this will be something like the industry-government task group that drew up the original MSRA Air Transport Society.

The best mobilization plan that Restani, Conroy, and the group will see is the NSM&A Air Transport Mobilization Survey, completed last month under Restani's chairmanship. That mobilization plan is set out in its details. But since a plan may not cover all situations, mobilization depends on the immediate situation, the size of the new mobilization effort will have to be decided on the spot, from here on out. And the military agencies, CAA, FAA, and other agencies, plus private industry, will also double keep coming up with new ideas.

ICAO Recommendations Safety Provisions

Airlines and other aircraft operators should strengthen passenger seats now to withstand a crash impact of nine times gravity (9G), the Aerworthiness Branch of the International Civil Aviation Organization has recommended in a recent report to its ICAO.

Other safety improvements recommended for investigation are:

- **Headrest-tilting seats:** opening of headresting seats further apart so passengers do not hit the seat in front of a crash, standard harness attachment.

The U. S. Civil Aeronautics Board has advocated backward-facing seats for years. But most current airports it: they also oppose this idea because of emergency landing. Airlines reject these related changes because of high cost and because they fear passengers would not like them.

Latest feasible suggestions for investigation strengthen existing seats to 9 G or more, "swing-free" design, whereby on impact shock, the seat tips back putting the passenger in passive position so his body does not hit forward into the seat, and his body does not tend to come out of the back.

The interesting problem comes up in the U. S. this summer at the second annual Aerotech Review meeting. Are FAA, CAA, FAA, airlines, manufacturers, ALPA and others will go over the regulations made to date. Agenda will be published about June 1.

At the ICAO meeting, the U. S. has more other suggestions for a proposed seat strength of 9 G or less. But the proposal was made a more non-accident condition instead. U. S. says it is too early to make 9 Gs the FAA requirement, there are too many other possible regulations such as 12.5 G strength or any of the other existing safety ideas, now in development stage.

Policy for '52?

Recent Restani remarks give clue to transport's role in near future.

The future shape of U. S. air transport policy may be helped from some statements of Delta Director, former Civil Aeronautics Board Chairman, now Undersecretary of Commerce and high in the ranks concerned with aviation, in an interview with ENR.

His statements, including those before the Airport Operation Council and the management and board of directors of Trans World Airlines, give the policy of Restani on the air transport industry and service airlines. The facts are here to stay, they are new get some outside critics instead of 3-year "temporary" resolutions. They need to be called "Restani" reforms, but "Restani" is not an official title. Restani's position is as follows: • **Local service airlines:** The facts are here to stay, they are new get some outside critics instead of 3-year "temporary" resolutions. They need to be called "Restani" reforms, but "Restani" is not an official title. Restani's position is as follows: • **Local service airlines:** The facts are here to stay, they are new get some outside critics instead of 3-year "temporary" resolutions. They need to be called "Restani" reforms, but "Restani" is not an official title. Restani's position is as follows:

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SWORN IN: By Commerce Secretary Hoover, Undersecretary Restani (left) is set to act.

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Puerto Rico Nonskeds Get Tighter Controls

A Civil Aeronautics Board and Puerto Rico government inquiry of the Western Pacific crash of June 5, 1951, has resulted in some new restrictive rules, by needed reforms, according to an official communication from the office of the Governor.

These rules raise out of a series of conferences with former CAA Administrator Donald Nyrop, CAA officials Brian Hensley, William Roberts and James G. Cooper, and Governor Luis Muñoz Marín. The Governor has ordered the following measures:

- **All responsibility rests on the U. S. Federal government.** It has full jurisdiction of air transport between Puerto Rico and the U. S. The Insular Government will cooperate to oust out safety measures at the airports.

- **No two-engine flight of certified airlines may fly between Puerto Rico and the mainland unless they use the same route followed by Pan American and Eastern on Miami-Puerto Rico flight.** This route takes place within 60 miles of land. No direct two-engine flight will be permitted to Puerto Rico.

- **Before a two-engine flight may fly north of West Palm Beach, the carrier must get a special permit from CAA. Reserve fuel requirements are specified.** • **Redundant CAA inspections will be required.** • **CAA inspectors will be required to inspect the plane.** • **Plane must carry ditching equipment.** The inspection must be complete. And a CAA safety agent at the Air Mobile Airport must verify the check, the fuel and oil, and the plane's weight.

- **Previous Rules—**After the Puerto Sibau crash on October 7, 1949, the regulations were also tightened up, but not as much as after the same recent crash.

Now's what the Puerto Rico Transportation Authority required after the 1949 accident crash that killed over 50 Puerto Rican victims. All possible flight rules to get a special permit issued by the Puerto Rico Transportation Authority. CAA may have to make an inspection of the plane.

It has been customary for CAA agents to make occasional trips with the carrier to check their air safety and safety. And the CAA also makes checks on the accidents of their airline maintenance

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Transcontinental Interchange Begins

The month starts the biggest test of CAB's big role among airlines' experience-gaining, side-by-side interchange over existing routes, instead of growing airways new routes.

The list lack of airlines air service to the west has started, as Braniff, Continental and American Airlines have two interchange planes, Houston to Los Angeles.

Once daily, a Braniff crew starts out at 5:15 p.m. flying a DC-6 from Houston to San Antonio. Then a Continental crew flies the same plane to El Paso, where an American new title over and pilots it to Los Angeles. Some thing would be to reverse on the east-bound flight.

On the other side interchange—Alaska-West Coast via National, Delta and American—there are two flights daily, one to Los Angeles, the other to San Francisco. On the Alaska-West Coast Delta-American interchange, there are three round-trip daily, one to San Francisco, two to Los Angeles.

LAA Cuts Copter Operating Expenses

Los Angeles Airways, pioneer metropolitan helicopter service, cut operating expenses per revenue mile by 12 percent this March compared with a year ago. And while expenses per revenue mile were down from \$1.25 to \$1.08, actual loaded miles have risen 26 percent, from last year's 7,416,493 to 9,419,244 as March this year LAA completed 93 percent of scheduled mileage this March, compared with only 96 percent a year ago.

Then is the book down on LAA's next cost reduction for the period, March 1959-61.

Los Angeles Airways
Operating Expenses per Revenue Mile

	1958	1959
Direct operating expenses	\$1.20	\$1.04
Other direct, flight attendants	.25	.25
Overhead, flight attendants	.10	.09
Ground crew	.05	.10
Ground crew, maintenance	.05	.05
Airport & parking	.01	.01
Oil & fuel	.04	.10
Depreciation, ground crew	.04	.10
Total expenses	\$1.69	\$1.54

U.S., Netherlands Start Air Talks

The State Department has begun bilateral air negotiations with the Netherlands, there has been no formal agreement between them since the U.S.

deposed for Multi-Nation Air Transport Agreement of 1949.

Outcomes of the talks is expected to be like the U. S. and the U. S.-French agreement, following the "Bernards Principles." Civil interline would be that current met not be too many planes on the routes, but everyone has through intense competition and low level fares.

Charter Flights Get Under Deadline

The Civil Aeronautics Board will by this deadline decide before Mar. 23 if the travel agencies like Youth Agency fly to Europe on agency-chartered planes this summer. But CAB's Mar. 23 policy forbidding any more "ad-hoc charter" chartering still stands. Some observers say it's unlikely more than 500 of Agency's 1300 members will make their trip on Agency chartered flights this summer. The Board says Agency must contract with the regularly scheduled trans-Atlantic air carriers for the flights.

Cool IATA Reaction Seen to Ocean Coach

Qualified observers at the Civil Aeronautics Board and State Department say they would not be surprised if anything like the International Air Transport Assn. might decide at the current Bermuda conference. But they doubt that Pan American will get the other carriers to agree to its trans-Atlantic air coach program, which is approved by the CAB, is for a N. Y. London 5400 roundtrip coach fare (\$125 one way) and \$711 regular fare (\$395 one way).

IATA members must vote negatively to get a decision. In this period of rising costs, many carriers are set against lowering fares radically.

Besides the PanAm air coach program, the real battle area at the moment is at IATA's attempt to control fares for the whole Western Hemisphere. Right now, the only "load-free" area is the Atlantic Ocean and the South American continent, Argentina, Brazil, Chile, Paraguay and Uruguay. Two big obstacles to IATA's getting control of fares are Empire preference policy, on such as British Overseas Airways' Caribbean 1956, and gateway transportation, as in Argentina.

The CAB-approved American plan for trans-Atlantic air structure, New York-London, persists.

• **Class-class service** in the year 1960 would be kept from existing until the U.S. has air service by restrictive positions. High seating density 1000

Standardizer, 65 to DC-6 or Constellation, 60 to DC-3, limit of coach seats to one-third as many and make available as regular service in 1959, we have seen, no extra-charge coach lighting and a minimum service standard generally.

• **Regular service** should be \$707 one way and \$711 round trip, whether IATA accepts air coach or not.

• **Alternate proposal**, if IATA rejects air coach special winter roundtrip rate (to \$649, 75 times the regular one-way fare).

Military Travel Up On Scheduled Lines

Scheduled domestic airlines are doing about \$1,750,000 a month of official military travel business. They expect this volume to increase, says an Transport Assn. vice president and traffic manager M. J. Berman. The carrier's official military travel account business compared with an average of only 5.5 million a month in the pre-Korea fiscal year ended June 30, 1959.

Am. and his organizations are now negotiating final 1951 military traffic contracts with Defense Department. The usual defense military discount of 30 percent from filed tariffs is expected to be renewed. Military is expected to eliminate the "bad passenger disease," which lowered oil travel over

CAB Examiner Hits 'Regular' Nonskeds

Civil Aeronautics Board Examiner Bruce Fredericks says CAB should reject the negotiation letter of two carriers—Trans American Airways and Great Lakes Airlines—for raising regular seat service. Regular service by a rounded contract the Board's Economic Regulation 291 forbidding the practice, the examiner says.

Examiner Fredericks also says the Board to stop Edward Watt Labor and Sky Coach Airline from giving uncontrolled transportation.

SHORTLINES

• **Air France**—French airfare has started through-flight service, New York-Geneva, leaving New York, Wednesday, with a short scheduling stop in Paris.

• **Air Line Shorelands and Shorelands**—First convention of ALISA starts a Chicago-Tokyo air service with ALPA start 1947, the union now has over 3000 members.

• **All-American Airways**—AAA general traffic message Crawford W. Case has resigned. He is succeeded by Robert G. Moore. Crawford W. Case will start an airline traffic account and service agency, he plans to market a ready-reference guide and will handle other traffic and sales matters.

• **Bozell International Airways**—Carrier flew a round first quarter 182,076 revenue passengers, up 32 percent from 1958. First quarter earnings were \$443,111.

• **British Overseas Airways**—BOAC has dropped the Latin American west coast service, Panama-Santiago, because of intense competition from Panagra and Iberia. Apparently the line lost \$5,000,000 as of the first 11 months of fiscal 1959-61. Loss on the rest of BOAC's SA routes was \$2,555,600. BOAC's South American line is via LaBona, Avon, Bermuda, Niassa, Bismarck, Singapore, and Jakarta. Layoff of service was between Panama-Santiago. . . . British Colonial Office will build a new airport at Singapore with a 7500-ft runway, big enough to take the de Havilland Comets on order for BOAC.

• **Capital Airlines**—Capital's first quarter operating profit of \$120,146 compares with a loss of \$120,012 a year ago. This is Capital's first profitable quarter in 24 years. Revenues for January-March were \$1,777,561, compared to \$5,819,065 a year ago. . . . March revenues of \$1,071,132 yielded operating profit of \$12,354.

• **Colonial Airlines**—Colonial started service to Washington, N. Y., last week, through the new Brooke County Airport.

• **Continental Air Lines**—CAL has appointed Col. Harry C. Short vice president in charge of an maintenance and engineering. He was general manager of the CAL Dealer modification center.

• **Continental** has started negotiations with the city of Denver for land at Stapleton Airfield. CAL plans to build two hangars and buildings in a present company home. The company will finance, design and build the \$3-million quarters itself.

• **Mid-Continent Airlines**—Directors have proposed P. H. Carr loan assistant secretary to secretary of the company.

• **Northeast Airlines**—NWA and Scandinavian Airlines have agreed on a Chicago-Tokyo air service with ALPA start 1947, the union now has over 3000 members.



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usually the main link in this circuit.

► **Pan American-Gasco Airways-Peasage** flew 12,701,561 revenue passenger miles in March—up 31 percent over 1952. March revenue ton miles came to 1,703,232, up 35 percent.

► **Piedmont Airlines—Load factor** on the local service route was 514 percent in April—with 14,724 passengers carried. 5,347,614 revenue passenger miles. Passenger miles the first four months were 11,822,064—up 75 percent.

► **Seaboard & Western Airlines—Completing its fourth year's operation last week, the air-railroad combined load totalled up 17,761,800 freight ton miles the past year. Five-year totals: 50,178,800 ton miles, 8,845,000 revenue passenger miles, 1756 acres cropland. On the Tokyo line, Se-Wa has carried 4,576,890 in military cargo and 5800 men.**

► **Southern Airways—Local service air-line carried these times the traffic the first quarter of this year over last year. January-March traffic was 1,146,779 revenue passenger miles.**

► **Trans World Airlines—First-quarter net profit of TWA was \$10,028—the first three-quarter profit since 1945. Last year's loss was \$1,848,704 the first quarter.**

► **United Air Lines—UAL's April traffic** was 147,287,800 revenue passenger miles—up 74 percent from a year ago. Mail ton miles were up 424 percent to 1,131,000, express up 38 percent to 886,000, freight down 9 percent to 2,082,000. UAL is doubling Honolulu-California service June 1 with two roundtrips daily using Stratojets. — Company expansion plans at Detroit are delayed by a city ordinance that the proposed city construction bond issue was unconstitutional without the popular vote, but the city council is working on a compromise. (Continental Air Lines is building its own improvements, and is therefore unaffected by similar delays.)

► **Western Air Lines—WAL first-quarter profit of \$168,912 compares with year-ago loss of \$37,707. Total operating income was up 23 percent to \$3,650,536. Dividends total a 25-cent dividend payable May 15 to stockholders of record May 1. — Company has five Douglas DC-4s on order for 1952 at total cost of over \$5 million. A recent \$5 million line of credit will help finance the purchase; \$2.5 million of it was set as RFC debt. — Latest company promotion brochure features Western's service as the "nearest route to western defense contractors," for beneficiaries of 13 western states.**

We Mobilize for Freedom

WHY Controls are Necessary

One of the encouraging characteristics of the American people is their dislike for government controls. This augurs well for the future of their economic and political freedom.

But for the next few years we must not only tolerate but also help to make effective a whole battery of emergency government controls over our economic life. If we fail to do this now the future of that freedom we cherish will be imperiled. It is the purpose of this editorial—the third in a special series—to explain in simple terms why this is so.

After our military victory in World War II, we rushed through a demobilization which cut our military strength to about one-tenth of its wartime peak. Our allies did much the same thing. But the Russians maintained much of their wartime military strength and built up that of their satellites. With prodigious speed we switched from military to civilian production and went on to enjoy a roaring postwar boom—the greatest in our history.

This boom was in vigorous progress when, on June 25 last year, the Russian-sponsored North Korean army attacked South Korea. Our industrial production was falling along at almost twice its prewar level. We had labor shortages in many key industrial areas. Under the impact of heavy buying all along the line, prices were skyrocketing.

When the North Koreans smashed into

South Korea they smashed into our national consciousness this fact: if we want a fair chance to save our national freedom from destruction by Communist aggression, we must need to restore some of the military power we had so speedily written off after World War II. And we must do it with our resources already very fully occupied with a boom in civilian business.

Program Small Compared to World War II

Compared with our military effort in World War II, the mobilization on which we are now embarked is small. At its peak, under present schedule, it will absorb no more than one-sixth of the total national production. During World War II we reached a point when nearly half of our total production went far war-making.

Moreover, our economy now is much bigger and stronger than it was in World War II. During the last decade there has been an increase of about 15 percent in our labor force. Our workers have had the training advantage of steady employment. The capacity of our industrial establishment is two-thirds again as great as it was ten years ago. Since the war no less than \$79 billion has been spent to expand and modernize it.

Given time, the industrial giant we have created could pick up in its stride the added load of production for defense that now is occu-

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Kicking Your Public Around

A three ring in the long fight of the scheduled airlines against the airlines has been that the independents kick the customer around.

This unreasonable technique is not an exclusive feature of the independents, if we read our mail correctly. One would expect to see this in the airlines. One was partly responsible for an editorial last April 7 warning the scheduled airlines against letting their public service standards decline.

The other thicket was written to us by a well known Air Force general, now retired. We think he tells his story well and we quote a major portion of it. The protest says:

Reference your editorial, "Service of Prosperity," . . . how it another "loaded croquet." Early in February my wife and I planned a trip to Florida to begin in March and return in April. We didn't particularly care about the date—return of service was not the important thing, we being old folk. The return was confirmed on our tickets, which had been paid for and stamped in New York. Feb. 5, called for departure from Jacksonville via Eastern Air Lines Connection Flight 604 on the morning of Apr. 4.

Arriving home tipped off to friends that EAL was creating problems on a first class base regardless of confirmed reservations, we arrived in Jacksonville the night of the 4th and spent at a hotel to be certain of being in plenty of time for our scheduled departure the next morning.

Upon calling EAL reservations that night to check on, I was told, as I had been advised, that our names would be placed on the waiting list. I explained that we had our space confirmed for nearly two months, and I advised to accept my position on the waiting list.

After a long discussion, the young lady at the other end of the line agreed to issue me tickets.

At the airport the next morning we had to stand in line for 15 to 20 minutes while our tickets were made out and our first-class excesses and charges were made out and charged. Finally, the plane was announced and a road airplane called to get aboard. Boarded bus seats, carefully checked by three officers, discovered that we sat out of us and refused us the status of the plane to assist the rest of their passengers. My wife and I could not get seats until the aircraft, a very courteous and efficient young man, advised our disappointment and when it was would like to sit together in "Sky Palace." We would sit and did very thought of it a few rows for four people forward of the regular passenger compartment.

After 30 minutes the hostess announced that the plane was overbooked by two and would not take off until two people voluntarily disembarked. About ten minutes later there was a sudden announcement and about five minutes after that we did not sit off, two people having left the plane.

Up to this point I had attributed the confusion to EAL's sloppy manner of doing things, but after conversation with one of the pilots I came to the conclusion that according to EAL, it is not just that, or to be put it, by the fact that "too many empty seats are carried otherwise."

Now, I do not think that Eastern or any other airline should be regarded as operator at a low level factor if they can sell the goods. I neither think "low level" are the best way to sell, but I think it a hell of a way to run an airline deliberately to place people with long confirmed space at competitive at the airplane with people who are there on a standby basis. That it is not necessary to do this is evidenced by American Airlines and National Airlines who, always better reservations and who do things in a snappy and efficient way.

The second letter is similarly documented, describing similar outrageous-like practices. The writer is H. W. Richardson, editor of a leading business magazine, Construction Methods, who wrote his original letter to the editor involved. He says:

I do not like the way Eastern Air Lines checked our second last week on what should have been a routine and pleasant flight from Knoxville to Washington. I took Chicago & Southern ticket for continued flight from Pittsburgh to Washington on CAB Flight 16 to Knoxville, EAL Flight 412 to Louisville and EAL Flight 412 to Washington. This reservation had been accepted and confirmed by CAB at Pittsburgh, Apr. 27.

Everything we had said I listed at Louisville on 412 about 10 minutes late. I saw my baggage being transferred to 412 while I went in to check the desk. The desk clerk saw her when I got back and on flight 412 I was told there was no room for me. I insisted that the desk had just closed me a moment before, but that made no difference, the plane was full and, therefore, I could not come aboard. The ground crew hurriedly checked the tickets this second had already closed, with the thought that perhaps there might have been a standby there. But they reported that all passengers were confirmed, and I was told I could not get on.

About then 412 took off and I was left standing on the ramp and someone showed 412, loaded again on that plane, so all I could do, with my baggage already rolling, was to slide that very uncomfortable and slow flight. The prospect of missing a dinner appointment with my brother in Washington did not cheer me. We happened over the mountains on a rough flight and landed in Washington not far off schedule but, of course, all my plans had gone haywire.

If Eastern or any other airline is going to start granting confirmed reservations like they did during the last two days of several years ago, I think I will just give up flying and go back to my car. Of course, on my business calls for \$5,000 to \$5,000 when a week, I like to fly by any means I can, but I am certainly not in a mood to ride my nervous like this from the last service.

Fortunately, Eastern's policy is in the minority, we believe. There are various legal aspects to honoring confirmed reservations which most lines understand. These should receive attention to the public by carriers.

Eastern and American compete in a price steadily rivalry at Washington which, we have observed, seems an antiquated and well-organized pet. Here, my steadily rising New York transportation is put on the next available plane—whether American or Eastern—without regardless of whether he holds an Eastern or American ticket. Each line honors the other's tickets on this run. American, at least, honors all reservations before admitting standbys. It is difficult to see how this practice of honoring reservations up to a reasonable deadline could cost American or Eastern—regardless seats.

There seems no complaint. They are a wrong—no that we will let—that the industry cannot kick the public around. If it does, it can expect inevitable retaliation. This includes some competitors. Beware of prosperity.

Progress—Study in Contrasts

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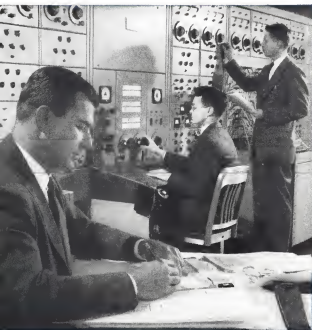
From a telegram sent us by Slack Airways May 9

"Schedules of all New York Central freight lines between cities of its system and to all line points are listed on a "route book" now being distributed by the railroad. The booklet shows schedules of cars by ELAPSED DAYS to and from about 200 freight stations which originate, terminate or transfer about 95 percent of the Coast's less-than-carload freight."

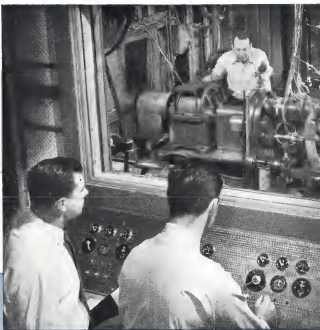
From the New York World-Telegram & Sun, May 9

—Robert H. Wood

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